Volume 17 March, 1952 Number 1

CASTANEA

The Journal of the Southern Appalachian Botanical Club

Contents

The Canaan and Stony River Valleys of West Virginia
H. A. Allard and E. C. Leonard 1

Notes and News 61

Book Reviews 69

Published for the Club
March, June, September, December
at
West Virginia University
Morgantown, W. Va.

THE SOUTHERN APPALACHIAN BOTANICAL CLUB

PRESIDENT
William B. Fox, North Carolina State College, Raleigh

VICE PRESIDENT
Wilbur H. Duncan, University of Georgia, Athens

TREASURER
Nelle Ammons, West Virginia University, Morgantown, W. Va.

SECRETARY
Elizabeth Ann Bartholomew, West Virginia University, Morgantown, W. Va.

EDITOR
Earl L. Core, West Virginia University, Morgantown, W. Va.

ASSOCIATE EDITORS
A. B. Massey, Virginia Polytechnic Institute, Blacksburg, Virginia
W. H. Camp, Academy of Natural Sciences, Philadelphia
A. J. Sharp, University of Tennessee, Knoxville, Tenn.
Wilbur H. Duncan, University of Georgia, Athens
Clarence E. Taft, The Ohio State University, Columbus
William B. Fox, North Carolina State College, Raleigh

All persons interested in the botany of the Southern Appalachian Mountains are invited to join the club. Dues, including subscription to the Journal, are $3.00 per year. Single copies of *Castanea*, seventy five cents.

Notes and short scientific papers relating to the botany of the region are welcomed and will be published to the extent that the size of the Journal allows.

Authors will receive six gratuitous copies of the issue in which their papers appear. Separate reprints, if ordered in advance, will be furnished at cost.

CASTANEA

The Journal of the Southern Appalachian Botanical Club

Volume 17 March, 1952 Number 1

The Canaan and the Stony River Valleys of West Virginia, Their Former Magnificent Spruce Forests, Their Vegetation and Floristics Today†‡

H. A. Allard and E. C. Leonard

INTRODUCTION

The writers for many years have been interested in the vegetation and floristics of various physiographic provinces of Virginia and West Virginia. Firsthand observations of surviving remnants of some of the finest spruce forests in northern Maine, which have escaped destruction in high ravines of the Traveller Mountain complex, together with studies of the isolated, spruce-fir caps on lofty White Top in southwest Virginia, on Clingman's Dome and elsewhere in the Great Smokies of North Carolina, have intensified the senior writer's interest in some of the great spruce lands of West Virginia. It must be admitted that Maine has been justly famous for its former, extensive coniferous forests among which several species of spruce and other conifers in many habitats were constituents in a major role. However, too little has been written of the great spruce forests of the mountain uplands of the south, some of which, namely those of the Canaan Valley and adjacent territory, in West Virginia, probably represented one of the finest climax spruce forests developed in the eastern United States, and perhaps even in the world.*

†The publication of this article has been aided by a financial grant from the authors.

‡An accompanying paper on the animal life of Canaan Valley will appear in the 1952 volume of the proceedings of the West Virginia Academy of Science.

*Information of a travelogue nature may be found in "The Blackwater Chronicle, a narrative of an expedition into the land of Canaan, in Randolph County, Virginia," by Philip Pendleton Kennedy, 1853, and in "Virginia illustrated; containing a visit to the Virginian Canaan, and the adventures of Porte Crayon (pseud.) and his cousin," by David Hunter Strother, 1857.

This magnificent coniferous forest, as has been the final fate of all our great forests, was ruthlessly destroyed within comparatively recent years. So completely did the lumberman and fire do their destructive work that in the unique Canaan Valley, where this forest climax had reached its highest development, scarcely a living remnant remains, aside from a few, small, surviving trees found along the swampy stretches bordering Glade Run, the Little Blackwater River, and other streams within this area.

The huge stumps and stray logs of the magnificent trees of this former great forest are to be seen everywhere (Figs. 5, 6, 8, 9, 11), but they are now so decayed, and for the most part so disintegrated, that they reveal nothing of the past except the position and relative size of the enormous trees which flourished here. This superb coniferous forest covered many adjacent areas of the high Allegheny Plateau of West Virginia, as well as the Canaan Valley. It ascended the slopes of the surrounding mountain rims and had captured the great, rocky, fog-shrouded highlands of the Stony River Valley country quite to the Allegheny Front.

A long interest in the floristics of this beautiful area has prompted a desire on the part of the senior writer to reconstruct some features of this climax spruce forest, more especially as it formerly existed in the Canaan Valley. This necessitated frequent and even long visits into the Canaan Valley and the wild, desolate, and uninhabited Stony River Valley country. It meant long and arduous days of climbing and exploration over the Cabin, the Brown, and the Canaan mountain rims, which completely shut in the Canaan Valley with an almost uninterrupted encirclement of spectacular mountain slopes. The senior writer has spent weeks at a time alone in this area, following with critical observation from early dawn till dark every detail of stream, swamp, and ridge, either camping in a light specially constructed tent or returning at night to a somewhat primitive hunter's camp on the western flank of Cabin Mountain near Glade Run, which had been put to his disposal.

The senior writer has studied this beautiful region very intensively, with a view to reconstruct the great coniferous forests which stood here. Information has been gathered from many sources. Several old-timers of the coterie of hardy lumbermen who actually worked in the original forest, have been frequently consulted to glean as many data as possible from them concerning former conditions which actually prevailed in this unsurpassed coniferous climax.

There are still many details, unfortunately, which are not as clear as might be wished. The old lumbermen were better observers of the practical aspects of logs and lumber of the trees than of the botany of the forest, the forest herbage or any features of the vegetation picture or its specific floristics. However, it may be of some interest to plant ecologists to know something of this former primeval forest and the secondary flora which has succeeded the great spruce forest, as one sees its trends, expressions and successions at the present time, though it is but an imperfect picture.

The floristics of this lofty plateau valley in many respects, too, is of exceptional interest for it is distinctively Boreal or Canadian in many of its features. The senior writer has found some of the rarest cold-loving plants of the North in this area, presumably representing an outlying relict flora which was at one time at home here following climatic conditions imposed by the Ice Age.

PHYSIOGRAPHY

The physiography of the Canaan Valley and the adjacent Stony River country is so striking that it may be of interest to present some of the more prominent features.

The Canaan Valley is a rather long and narrow area situated nearly due east of Davis in Tucker County about 3 miles by air line or 4 miles by the old lumber railroad which follows roughly the course of the Blackwater River to the gap between Canaan and Brown Mountain. This valley is about 13½ miles long with an average width of 2½ miles, the greatest width being 3-3½ miles from the Canaan to the Cabin mountain slopes within the 3250 foot contour. Keeping with the contour of 3250 feet, which is near the average altitude for the valley floor, the area embraces about 32 square miles.

The long axis of this valley trends in the southwesterly direction from Big Cove which is the northernmost limit. It is a comparatively level area enclosed with a continuous and prominent mountain rim, except where the Blackwater River finds egress at the narrow gap between Brown Mountain and Canaan Mountain. The abutting escarpments of these form the entire line of western highlands (Fig. 7).

The high eastern rim is formed by the beautiful Cabin Mountain range (Fig. 1), whose steep slopes swing around uniting with the slopes of Brown Mountain to enclose completely Big Cove on the

north. At the southern end the knobs and highlands of the Canaan and the Cabin Mountains approach each other and complete the encirclement of Canaan Valley.

Figure 1—Canaan Valley looking east toward knob of Cabin Mountain just north of Butler's camp on Glade Run. Top of knob near 4000 feet above sea level. Formerly covered with spruce and hemlock, now mostly with *Danthonia* and *Anaphalis margaritacea*, indicated by the white areas.

There is a very gradual fall of the valley floor from Big Cove on the north and from the southern extremity toward the gap between Brown and Canaan Mountain, so that the entire rainfall and drainage on the encompassing slopes flow inward and finds its way finally into the Blackwater River at this point. Many cold, tumultuous streams, some named and many unnamed, have their origin on the high surrounding mountain rim, all flowing into the valley. These build up the Blackwater and its tributaries, the North Branch uniting with the former and with Glade Run, all with northerly and easterly trends. The Little Blackwater River with its numerous tributaries rising in the Big Cove region (Fig. 7) flows southward to unite first with Glade Run, then farther westward uniting with the Blackwater River proper.

Although the streams may arise as copious springs situated well up the encircling steep mountain slopes, near the 3300 foot level, the floor of the Canaan Valley is so nearly base-leveled that the brooks from these quickly lose their impetuous rush when they reach the floor. Here they find very gentle gradients and flow sluggishly until they reach the Blackwater River. This river, near Davis, becomes a

wild, cascading stream at the bottom of the beautiful Blackwater Gorge.

Except near their origin high up on the mountain sides, the main streams of the Canaan Valley are very appropriately named Blackwater, for the waters soon become dark and saffron-colored as they course over the valley floor. This appears to be due to the abundance of tannin compounds derived from the coniferous vegetation, interacting with the iron compounds derived from dissolved shale and limestone rocks through which the streams flow. In reality these interacting materials have formed a veritable, highly dilute, natural ink resulting from the insoluble iron tannates precipitated out.

Figure 2—Looking north toward Snow Mountain in the Cabin Mountain range. In the foreground, sheets of snow-whiteness are contributed by cotton grass (*Eriophorum virginicum* forma *album*).

The valley is superbly drained and if no stream had succeeded in cutting across the mountain barriers, as the Blackwater River has done, the peculiar dish-shaped configuration, long ago, would have built up a vast, natural reservoir of impounded drainage water here.

East of the Canaan Valley, beyond the rim of the Cabin Mountain escarpment lies the Stony River area with its picturesque, artificial storage reservoir known as Stony River Dam (Fig. 4). The general level of this valley is near 500 to 600 feet higher than the floor of Canaan Valley, and some of the higher knobs attain 4,000 feet or more.

There is a gradual slope from the Cabin Mountain heights to the Stony River Dam reservoir, with a gentle rise again toward the Allegheny Front. North of an area known as Dobbin Slashings, the drainage waters flow northward into the Stony River system, thence into the North Branch of the Potomac. South of the encompassing highlands of the Dobbin Slashings there is a fall in altitude, so that the waters drain southward by way of Red Creek and other tributaries, finally reaching the Ohio River.

The Stony River Valley together with the Dobbin Slashings Basin is a very rocky, wild and desolate, uninhabited area (Figs. 5, 8, 9). In showery weather it becomes even more desolate since it is frequently blanketed in heavy fog or cloud much of the time.

GEOLOGY

The distinctive physiography of the Canaan Valley and the adjacent Stony River area is so intimately associated with the character and position of the rocks beneath that some attention may well be given to the underlying geological structures responsible for the terrain.

The Canaan Valley together with the adjacent Stony River Valley area treated in this paper falls within the Allegheny Plateau subdivision which extends from the Allegheny Front westward to the limits of the Appalachian Province.

The great uplift which gave rise to the present Appalachian mountain system terminated in late Permian time after many thousands of feet of rock material had been laid down in the ancient seas here and finally consolidated. With the subsequent great Permian upthrusts and foldings, the horizontally-placed rocks were subjected to intense foldings and torsions, and with their appearance as a land area erosional attack at once began. In the course of millions of years these interesting geomorphic and atmospheric forces have determined all the resultant land forms as we see them today.

The Canaan Valley. The distinctive topography and physiography of the Canaan Valley is derived from a great anticlinal fold of various rock strata known as the Blackwater Anticline, the long axis of which coincides approximately with the median line of the valley itself.

In an eroded anticlinal arrangement of the strata the successively younger rocks lie toward the limbs of the fold, whereas in a syncline

there is a reversal of this arrangement so that one encounters successively older rocks in passing from the axis to the limbs.

All the rocks in the Canaan Valley proper belong to the Carboniferous Period, the lowermost being those of the Mississippian series, followed by rocks of the Pennsylvanian series.

The east and west limbs, being the hard resistant Pottsville sandstones of the Pennsylvanian, have persisted to form the high surrounding valley-rim comprising the Canaan, the Brown, and the Cabin Mountains. These rock outcrops form the high lands extending westward over the Canaan Valley to Davis. Within the rim of the valley itself the next younger series of the Mississippian Period, known as the Mauch Chunk Series, outcrops as an almost uninterrupted narrow band, extending entirely around the inner slopes of the Pottsville rim. This series is chiefly a reddish or greenish shale formation, and being more readily dissected, has aided prominently in the degradation of the Canaan Valley to its present levels. It is

Figure 3—Looking north from Burley's cabin, Snow Mountain in the distance, 4082 ft. above sea level.

largely a soil maker, and standing in conjunction with the hard caps of the Pottsville series occurring everywhere around the valley, has produced a more or less characteristic slope contour with an inward curving concavity toward the mountain rim.

As one travels inward from the mountain rim toward the axis of the Canaan Valley over the Mauch Chunk zone, the next lowermost series of the Mississippian known as the Greenbrier Limestone ap

pears, forming an uninterrupted band of varying width entirely around the valley.

Beneath this and outcropping along the median axis of the valley, the relatively very hard and compact rocks of the Pocono sandstone lie exposed, constituting the lowermost element of the Mississippian series.

Along all the main streams and tributaries which drain the Canaan Valley, alluvial soils of recent origin occur, subject to flooding in heavy rains. Here extensive bogs and swamps are found, where some of the original vegetation still persists, in spite of the almost complete destruction of the forest during the days of lumber exploitation.

Most of the drainage brooks and streams arise high up on the Mauch Chunk series, into which they have usually cut deep ravines in many places. All the rocks of the Canaan Valley and its rim are those of the Mississippian series, with the exception of those at the south where the Catskill series of the Devonian Period outcrop.

The Stony River Valley. We have seen that the Canaan Valley physiographically is a great, rock-rimmed enclosure, begun as an anticlinal structure which, by differential erosion of its strata, has been carved into its present Valley configuration.

The Stony River Valley, on the other hand, is an example of a synclinal flexure with the long axis nearly parallel to that of the Blackwater Anticline of the Canaan Valley. This syncline is known to geologists as the Stony River Syncline. Its axis lies very near the long axis of the Stony River Dam reservoir, being just outside of its eastern shores.

The western limb of this syncline is made up of the Pottsville series of the Mississippian, comprising the Cabin Mountain complex, together with some higher knobs of the Conemaugh sandstones and shales of the Pennsylvanian series.

In travelling eastward down the low, inclined eastern slopes of Cabin Mountain toward the Stony River Reservoir, one leaves the lofty, rough, desolate area of the Pottsville ledges with their great boulders bestrewing the terrain, to pass over the Allegheny series of the Pennsylvanian, comprised of sandstones and shales; these extend quite to the western shore of this body of water.

From the eastern shore of the reservoir, and extending toward the Allegheny Front, a belt of the Conemaugh series of the Pennsylvanian outcrops, consisting of strong, grayish or brownish sand-

stones and shales. Beyond this to the east a narrow, irregular band of the Allegheny series again appears succeeded by the resistant Pottsville sandstones arranged along the crest of the Allegheny Front.

This is a brief account of the stratigraphic elements entering into the topography of the Canaan and the Stony River valleys, and the contrasting types of foldings responsible for the Blackwater Anticline and the Stony River Syncline. However, it gives one a clearer understanding of the reason why the various rock outcrops and successions of distinctive topographic and physiographic features appear as we find them arranged today in the Davis region, in the Canaan Valley with its high mountain rim, and in the shallow but exceed-

Figure 4—Stony River Dam reservoir from a knob on Cabin Mountain, looking toward the Allegheny Front. A dreary expanse of brush and secondary forest.

ingly rocky, desolate and uninhabited Stony River Valley extending to the Allegheny Front. In fact, with some knowledge of these basic geologic and stratigraphic features of the territory, the various topographic expressions of the terrain, the soils, the drainage systems and even the vegetation associated with these take on new meaning. It is at once obvious that the surface geomorphism as it presents itself today is clearly an erosional story written with fine engravings upon the great geological rock monuments of the past.

VEGETATION

It is unfortunate that so little exists in the literature describing the primitive forest expressions of any portion of our eastern area.

The pioneers found everywhere great climax forests of deciduous trees and conifers, each in their appropriate habitats, but these were lumbered and swept away with little or no written or academic comment. Some of these forests, such as the great spruce forests of the Canaan Valley region on the high, cool Allegheny Plateau lands west of the Allegheny Front, extending far westward on the higher Appalachian terrain, were cut within comparatively recent years. Yet there is only the barest mention of these in the literature, and any picture of this great conifer climax must be gleaned from small remnants of the primeval forests still existing in inaccessible nooks, or from reconstruction of conditions which the more intelligent and observant old lumberman can recall from his experiences with this forest.

Prehistoric Forests of the Canaan Valley and Adjacent Areas. The Coniferales in many respects are a very distinctive group. All are woody plants, and no paleontological evidence has yet appeared to show that herbaceous forms have ever existed. Furthermore they are all monoecious in habit. The stem is of xerophytic type and transpirational loss in many species is relatively low as compared with that of the broad-leaved Angiosperms. In cold regions due to high altitude or latitude the conifers are the only trees whose leaves can persist and withstand the low temperatures and high evaporative rates of strong freezing winds. The conifers thrive best where the angiosperms are least at home, and usually cannot compete successfully with the latter under more genial soil and climatic conditions.

In the evolution of the Gymnosperms and Angiosperms, as interpreted from paleontological material, both *Picea* (spruce) and *Abies* (fir) have been traced to the dawn of the Upper Cretaceous Period.

While nothing can be said concerning the actual forest or vegetation complexes which preceded the spruce climax of the present time, it must be recognized that this great, southern coniferous forest, from a geological point of view, is a modern expression of relatively recent physiographic associations. It would not have evolved or remained to the present day had the altitude at any time greatly decreased or the climate become warmer.

One cannot by any stretch of the imagination think that spruce and fir once thrived upon the puny knobs of the mature Schooley peneplain of Cretaceous times, when practically the entire Cumberland Plateau was reduced to near base or sea level. This is mentioned because it is possible that Bald Knob and Weiss Knob, near

the southern end of Cabin Mountain in the present spruce belt may represent remnants of this very ancient peneplanation stage. Other peneplanations have succeeded the more remote Schooley Peneplain of Cretaceous times, such as the lesser Harrisburg Peneplain of the Tertiary Period, but the floral assemblages which may have covered these are quite unknown.

Geological evidence, however, leads to the belief that, following the Tertiary peneplanation stage, there has been a strong renewal of the uplift components in the old Appalachian region, with a consequent rejuvenation of all the down-cutting streams. The deep gorge of the Blackwater River near Davis affords undeniable testimony of this more recent geomorphic event.

The great spruce forests of this Alleghenian Plateau probably evolved, also, as a result of this geologically recent upthrust. In Quaternary times the great Pleistocene ice sheets advanced and receded at intervals, pushing the great ice sheet as far southward as New Jersey, with great lobes extending far down into Ohio and very close to the western limits of West Virginia. There can be little doubt but that this close proximity of these great ice sheets must have brought boreal conditions to the Canaan Valley region, undoubtedly exerting a profound selective action upon the highly mixed floras of the middle Tertiary when tropical and boreal forms were supposedly commingled almost everywhere regardless of latitude.

Those geological events of renewed Appalachian uplift, followed by intense glaciation periods of comparatively recent age, must long have maintained boreal conditions in the West Virginia area. While such conditions were unfavorable to the more fastidious, broad-leaved deciduous trees, they were perhaps highly favorable to the more cold-resistant conifers such as spruce, fir, tamarack (*Larix*) and others of this class. Orderly successions probably followed every climatic swing toward cooler or warmer cycles with consequent changes in the dominance of a particular species, but of the actual details of this we know nothing.

With the great ice sheet approaching almost within the limits of West Virginia, surely conditions were favorable to the more boreal members of the coniferous type. It is possible, furthermore, that during this period these trees may have been at home at much lower altitudes. At present the spruce forests of West Virginia find their lower limits near 3,000 feet, and farther south near 4,000-4,500 feet

on certain knobs of the Great Smokies in North Carolina and Tennessee.

Whatever the climatic changes were that the more severe periods of glaciation brought about, these colder cycles would favor an extension of the great, boreal coniferous assemblages into lower altitudinal and latitudinal zones. The great boreal forests of the southern mountains as we find them today could not have existed as relict floras, as they are now regarded, if Tertiary or post-Tertiary uplift had not occurred in the Appalachians. These great uplifts do more than merely to rejuvenate the streams so that they become more youthful and active in their work of down cutting and dissection of the land surfaces, a striking example of which is the deep Blackwater Canyon at Davis. Such uplifts may effectively rejuvenate ancient, decadent, coniferous forests by creating more boreal conditions which the increased altitude has brought about.

A further substantial altitudinal uplift of the Canaan Valley region sufficient to make conditions less favorable even for the red spruce might prove highly favorable for the more cold-resistant fir (*Abies balsamea* (L.) Mill.). This change would reduce the dominance of the red spruce to a position of codominance with the fir and finally give the latter a dominant status in the coniferous aggregate. At the present time the reverse relation holds in the Canaan Valley region.

It is a rather striking coincidence that the great coniferous climax of the Canaan Valley as it recently existed here should have found a home upon the consolidated rocks formed in that geological era known as the Carboniferous. It was while the original unconsolidated soils of this period were being formed that the Gymnosperms were approaching the zenith of their importance in the flora, namely during the Mississippian of the Lower Carboniferous. They finally reached their dominance in the Pennsylvanian of the Upper Carboniferous. Today the great climax forests are still associated with these soils and rocks.

The Spruce Climax. The spruce forest assemblage as it formerly existed in the Canaan Valley region at the time of the white man's arrival represented a coniferous climax evolved by the boreal climatic conditions which high altitude has enforced upon the region.

The vegetation of the glades along the Little Blackwater River, the Blackwater River itself, Glade Run and other streams in the

area, has afforded some information concerning the conditions of the primitive forest growth which prevailed here. The supplemental testimony of some of the old lumbermen and woodsmen who worked in the area has been of great value in reconstructing certain features of the great spruce forest which had attained the climax stage here.

The more important trees of the climax associations were red spruce (*Picea rubens* Sarg.), fir pine (*Abies balsamea* (L.) Mill.), as it is called here, hemlock (*Tsuga canadensis* (L.) Carr.), yellow birch (*Betula lutea* Michx. f.), hard maple (*Acer saccharum* Marsh.), American ash (*Fraxinus americana* L.), basswood (*Tilia neglecta* Spach.), wild cherry (*Prunus serotina* Ehrh.), and beech (*Fagus grandifolia* Ehrh.).

Bird Cherry (*Prunus pensylvanica* L. f.), Choke cherry (*Prunus virginiana* L.), American aspen (*Populus tremuloides* Michx.), Large-toothed aspen (*Populus grandidentata* Michx.), striped maple (*Acer pensylvanicum* L.), and mountain maple (*Acer spicatum* Lam.), were prominent species on the burns, or occurred in the understory of the primary forest. It is highly possible that tamarack (*Larix laricina* (Du Roi K. Koch.) may have been a very sparse constituent of the forests of this region, for it has been found in nearby areas of West Virginia. It is evident that this tree assemblage is typically a far northern one in its affinities.

The spruce region did not present a uniform habitat throughout, for it included the damper and more level areas of the floor of the Canaan Valley proper, the high, steep, well-drained rocky ridges of the Canaan Valley proper, the high, steep, well-drained rocky ridges of the slopes of Cabin mountain, Brown mountain, and other portions of the Valley rim, as well as the high, shallow, rocky areas of the Stony River valley as far as the Allegheny Front.

Everywhere over this area red spruce was a more or less abundant tree, but its highest dominance was attained in the Canaan Valley itself. While fir occurred in small amounts this species appeared to be a minor element in the finer presentations of the conifer aggregate, and was confined mainly to the wetter soils of the swamps. Everywhere giant hemlock trees were scattered through the forest complex, together with some yellow birch in various situations, but in the Canaan Valley lowlands, the highest proportion of the crown trees was spruce.

From what can be learned of the forests of the mountain rim, speaking more especially of the western slopes of Cabin Mountain, the spruce was intermingled with a greater percentage of beech and hard maple. The latter in some situations appears to have occurred in nearly pure stands known as sugar groves.

Although hemlock appears to have constituted a relatively small proportion of the forest growth here, the largest giants of the forest were trees of this species, as testified by the numerous huge stumps.

A striking feature of this great spruce forest was the presence of an almost unbroken under-shrub stratum of *Rhododendron maximum* L. This shrub attained an average height of 8 to 10 feet or even more in some situations, and produced such a jungle of low-branching woody growth below that the original forest was practically impenetrable to man.

Everywhere below the rhododendron cover, which must have found the light relations of this coniferous forest particularly favor-

Figure 5—Stony River Valley looking southeast toward Dobbins Slashings. Distant black spots are small spruce trees. Altitude 3900 to 4000 feet. Now a wild, barren mostly treeless region.

able, deep beds of vegetable debris and water-soaked sphagnum had developed and in this cold, moist habitat survived a splendid relict flora represented by such far northern plants as the *Vaccinium oxycoccos* L., *Gaultheria hispidula* (L.) Bigel., *Geum aleppicum* Jacq. var. *strictum* (Ait.) Fern., *Aster tardiflorus* L., *Carex leptonervia* Fern., *Scirpus rubrotinctus* Fern., *Scirpus atrocinctus* Fern., *Caltha palustris* L., *Arisaema stewardsonii* Britt., and many others.

The reports of observant lumbermen indicate that deep humus layers consisting of forest debris and beds of wet sphagnum completely covered the forest floor, in which the huge supporting roots of the shallow-rooted spruce and other trees were deeply embedded. The thick blanket of cold, wet sphagnum together with other mosses appears to have been a constant feature of the floor of this coniferous forest and this maintained a permanently moist and highly favorable habitat for the cold-loving trees.

An examination of the surviving huge stumps and their extensive but superficial root systems (Figs. 5, 8, 9) indicates that the covering of the great roots was one composed mainly of deep accumulations of humus and sphagnum.

This forest was of great antiquity, as attested by the enormous size of some of the patriarchs, both spruce and hemlock. It was a vigorous, self-perpetuating climax of uneven-aged trees, indicating a vigorous reproduction throughout. The old lumbermen relate that in its composition dead or dying trees were scattered through the stands, which had finally reached the weakened state of an enormous old age.

Although most of the logs and stumps of the cut-over forest were too decayed to afford any reliable data as revealed by growth rings, the senior writer found a few which were in a better state of preservation. A spruce log one foot 9 inches in diameter without its bark, and from which the outermost layers of wood were gone, showed 240 annual rings. This log indicated that the tree was probably not far from 240-250 years of age. The width of the rings at different growth periods varied greatly, and there was reason to believe that the tree had reached a condition of old age when cut, since the rings at the periphery had become very close; 26 rings were counted within a space of 1 inch.

Some of the hemlock stumps are of gigantic proportions. One stump standing on a slight knoll between Glade Run and the Little Blackwater River, very irregular in shape and hollowed at the base, had a circumference of 18 feet breast high. The greatest diameter of this stump measured 7 feet and the shortest diameter 5 feet (Fig. 11).

Another sawed stump found on the lower slope of a knob of Cabin Mountain near Glade Run, presumably a hemlock, showed a maximum diameter of 3 feet at 18 inches from the ground, the smaller diameter being 2-1/2 feet. It was possible to count 340 growth

rings on this stump, and the tree was probably 350 to 375 year old when cut.

During the period of most rapid growth as indicated by the wider growth rings, 13 rings to an inch were shown. At this time the tree was in its prime and near 75 to 100 years of age. The rate of growth gradually decreased toward the periphery to 22 to 25 rings per inch. Near the periphery this number increased to 40 to 45 rings per inch, indicating conditions of approaching senility for the aged giant.

The destruction of all the forest growth completely changed the habitat relations of the area. Sunshine and air having free access to the exposed organic soil, warmed and dried these superficial layers and hastened bacterial destruction of the humus. The inevitable agency, fire, finally swept over the areas, burning everything combustible down to the mineral soil or rock itself. As a result, the great stumps in many areas with their root system now completely exposed, literally stand upon the earth and rock (Fig. 9). One wonders how

Figure 6—Looking north along the axis of Cabin Mountain from a knob near Burley's cabin. Left slope of the knob descends to the floor of the Canaan Valley. Trees and brush largely a fire sub-climax of Pin Cherry (*Prunus pensylvanica*), and other species.

these giant trees maintained their nutrition in such an environment. It is obvious, however, that the rich humus-sphagnum blanket exercised a very important function in this coniferous forest.

In many places on the ledges of Cabin Mountain, the stumps now rest high upon the rocky debris, and everywhere they appear

as if propped up from the ground, as they stand on their giant, radiating roots (Figs. 5, 6, 8, 9). It is obvious that their roots in life were buried in deep layers of humus and sphagnum which had accumulated around them, but later had been destroyed by a new order of conditions.

There were no oaks nor hickories in the entire region. The senior writer saw few red maples (*Acer rubrum* L.). There were no pines of any sort, although a native claims that a large, solitary pine once grew in the Stony River Valley area. This may have been one of several of the northern ranging species, or even a southern species at the upper limits of its altitudinal range. At the present time a solitary individual of *Pinus pungens* Mill. stands in the secondary brushy cover near Davis. This is a dry site tree, however, and could not well have found a home in the dank, water-logged humus and sphagnum of the original spruce-hemlock forest.

Only a few woody lianas exist here, such as familiar grape vines, Virginia creeper (*Parthenocissus quinquefolia* (L.) Planch.), poison ivy (*Rhus radicans* L.), greenbrier (*Smilax*), or others of more southern distribution. Two other vines were seen in the region, one being *Clematis virginiana* L., very common in the swamps; another, Dutchman's pipe (*Aristolochia durior* Hill), flourishing in rich woods on the slope of Cabin Mountain near Big Cove and elsewhere, but very rare and probably near its upper altitudinal and climatic limits here.

The spruce forest climax as it orginally found expression in the Canaan Valley region had a distinctive local facies in some respects as compared with the spruce forest climax developed in Maine or in the Great Smokies of the South.

The senior writer recalls one of the finest remnant spruce forests which he studied in Maine in 1938, far up the northeast slope of North Traveller Mountain where it had escaped destruction in a deep and protected ravine. This forest was composed mainly of the same tree species as the West Virginia spruce forests, but with the addition of the paper birch (*Betula papyrifera* Marsh.). Travel was comparatively easy in this forest because a shrub stratum was almost wanting. The aged spruce, fir, and broad-leaved giants had fallen everywhere, and reproduction was flourishing in the gaps. A dense, shrubby undergrowth did not exist anywhere in this forest. Every stump, log, trunk and the ground beneath, was felted with vividly green mosses, liverworts, and lichens, and travel upon the forest floor

was always over deep, cold, wet, spongy, organic blankets of humifying material supporting a covering of living mosses and lichens.

In southwest Virginia and in the Great Smokies of North Carolina and Tennessee where the spruce forests appear as forest caps restricted to the highest knobs near 5,000 ft. or higher, these stands may be usually free from a dense shrub stratum likewise.

Figure 7—Looking west from top of Cabin Mountain over the floor of the Canaan Valley, toward Brown and Canaan Mountains in the background. Narrow strips of wooded areas follow the course of the Little Blackwater River to the left.

Throughout the Canaan Valley region spruce and rhododendron formed an intimate association, beneficial probably to both. The latter was in an altitudinal climatic zone highly favorable to its development, although the spruce was near its lower altitudinal climatic limits for this region. There is reason to believe that the deeper shade induced by the dense rhododendron thickets below the spruce aided materially in maintaining a lower temperature level for these trees. Whatever the mutual benefits, this particular spruce climax favored a superb rhododendron understory, and relicts still persist today in the swampy stretches along Glade Run, the Little Blackwater River and elsewhere in the area.

Mountain laurel (*Kalmia latifolia* L.), known as *little laurel* to the natives here, appears to have been an unimportant element of this coniferous forest generally, and the senior writer has not seen more than one or two plants anywhere in the region. It was more abundant on some of the higher, drier rocky terrain in some areas.

It is probable that increased altitude would reduce the rhododendron understory. A marked increase in altitude would tend at the same time to favor an increasing dominance of the fir until alpine conditions prevailed. This is inferred from the fact that in the far north it is the last tree to give way to an alpine flora, and on the highest knobs of the Smokies the southern fir (*Abies fraseri* (Pursh) Poir) — supplants the spruce.

The great coniferous climax of the Canaan Valley and adjacent areas in West Virginia must be regarded as a response to highly favorable climatic and soil relations due to altitude and physiography. As in the northern boreal region where similar coniferous forests flourish, the climate is cold and the growing season short. In the Canaan mountain highlands a snowstorm of considerable intensity was recorded many years ago on June 14. Frosts may occur at any time throughout the summer. During the week of August 17 to 24, 1941, while camping on Glade Run near the floor of the Canaan Valley at 3,250 feet, the senior writer's thermometer recorded a temperature on two mornings at 7 A. M. of 37° F. in the cabin. The bright sun is burning hot due to a thinning of the air mass with altitude. The nights are invariably cool, the temperature usually falling below 60°, and frequent heavy fogs prevail. Extremely cold water with temperatures near 45° at the springs high up on the slopes of the surrounding mountain rim, flows continuously into the valley to cool the soils and bogs of the sluggish drainage systems.

Before the great forests were cut colder and wetter soil conditions obtained than one finds today. Some of the old lumbermen relate that patches of snow and ice sometimes remained in rocky ravines beneath the heavy forest covering almost until midsummer.

Fogs are perhaps an additional important factor in maintaining optimum conditions for this type of spruce forest. In the Canaan region this atmospheric phenomenon was almost of daily occurrence, and heavy fogs or low cloud always accompanied visitations of thunderstorms and showers. Fog was especially frequent and dense in the much higher Stony River Valley region, soon appearing with practically every moist east wind which swept in over the Allegheny Front. The natives ascribed this striking phenomenon to the presence of the Stony River Dam reservoir but it is obvious that this tiny body of water could have had little to do with the phenomenon.

Owing in part to the high altitude of the terrain and to strong deflections of the wind by the surrounding mountain topography the

weather in the Canaan Valley was characterized by much windiness, more especially when storms were causing rapid displacements of the air masses.

Frequently the mountain rim of the Canaan Valley, more especially the Cabin Mountain escarpment, seemed to catch and to deflect the winds with a downward component. This would distribute great rolls of fog along their crests, just as a snow fence rolls up the snow in drifts to the rear of the obstruction. In unsettled weather these fog rolls, day after day, drove against the lofty slopes of Snow Mountain north of Big Cove. At times they seemed actually to tumble over the entire Cabin Mountain range, to remain poised ominously just below their crests on the western slope, or in more stormy periods to descend as a great, driving blanket of cloud almost to the door of the camp on Glade Run in the Canaan Valley. These stormy periods always brought cooling, saturating mists, and unquestionably the great spruce forests of the area profited by these prevalent atmospheric conditions. As a matter of fact, similar conditions prevail in the mountains of Maine, in those of New Hampshire, and on the high knobs of White Top and Mt. Rogers in southwest Virginia, and the spruce or fir-covered knobs of the Great Smokies of North Carolina and Tennessee.

Destruction of the Forest. It is not necessary to go into all the historic details relative to the first clearing or lumbering operations in the Canaan Valley. It is enough to state that the first permanent settlements were probably made at its southern extremity, while until within comparatively recent years the greater portion of the area elsewhere remained in primitive forest.

A railroad was not brought into Tucker, Grant or Mineral Counties until 1866, and the Thomas and Davis branch was not completed until 1884. Up to this time, then, the great spruce forests of the Canaan Valley and adjacent areas existed in their primitive glory.

In 1892 the West Virginia Pulp and Paper Company, of New York, established mills at Davis, but the pulp was obtained for the most part from the region of Shavers Fork of Cheat River to the west of Davis. In 1907 the Babcock Lumber and Boom Company of Pittsburgh established huge mills on the Blackwater River at Davis, and constructed 31 miles of standard gauge logging railroad eastward into the great spruce forests of the Canaan Valley, some of the spurs climbing the Cabin Mountain ridge to penetrate the forests of the Stony

Figure 8—Spruce stumps on rock rubble on crest of Cabin Mountain, near Dobbins Slashings; Stony River Valley in the distance.

River Valley, as far as the Allegheny Front. This brought certain destruction to one of the finest and most extensive southern spruce forests, which had, if correctly presumed, survived as relicts from the great Glacial Periods.

Extensive travel on foot throughout this area has shown that no topographic map has yet been published which indicates all the ramifications of the old Babcock Lumber and Boom lumber railroad.

One line of this lumber railroad followed Beaver Creek to a point within a short distance of Gatzmer. Another line followed the Blackwater River where it divided, one branch being carried northward into the Canaan Valley to cross the Little Blackwater River south of Big Cove. After crossing the Little Blackwater this branch turned sharply southward along the western flank of Cabin Mountain, following Glade Run and Sand Run to a point on Freeland Run at the foot of Bald Knob. This peak has an altitude of 4,375 feet and is the highest point in the Cabin Mountain range.

A more southern branch crossed the Blackwater River at old Camp 70, where this stream leaves the Canaan Valley through the gap between Brown and Canaan Mountain. This spur swung around just south of the Little Blackwater River connecting finally with the spur which crossed the Little Blackwater at a point on Glade Run.

Another branch left the lowlands of Canaan Valley near the head waters of Glade Run in a northward trend up the west slope of Cabin Mountain, finally crossing this ridge at a gap here, and entering Stony River Valley. This branch curved sharply southward around the southern tip of Stony River Dam reservoir, following the easternmost shores to the north end, then swung sharply back on its course to the Allegheny Front.

Other short spurs appear to have led off from the Stony River Valley branch to push northward along the west slopes of Cabin Mountain into the lumber areas near Snow Mountain, but none of these are indicated on any of the topographic maps of the area. Lumbering in the Canaan Valley area continued from 1907 until about 1924, when Fred Viering, superintendent of the Babcock Lumber and Boom Company was killed by an engine which left the track on Cabin Mountain. This brought an end to active lumber operations in the immediate region of Canaan Valley and Stony River Valley.

The tracks and cinder embankments of these old lumber railroad spurs are now becoming ancient landmarks recalling a period when

hordes of lumbermen were actively engaged in cutting the great primeval spruce forests of this area.

The iron rails of these standard-gauge lumber railroads have long since been removed, and the heavy cross ties of locust, chestnut and beech have nearly disappeared through decay. There it little evidence now of the many lumber camps which were erected for the accommodations of the men, or of the splash dams on the creeks, or the bridges over the North Branch, Glade Run, the Little Blackwater and the Blackwater Rivers. Scarcely a remanant of the forest remains, and ere long even the railroad beds will become mere levelled paths over the meadows and hills, covered with an invading growth of trees which are already in evidence.

Fire followed the cutting of the lumber and became the final unrestricted agency of destruction on every hand, so that today, scarcely a worthwhile tree remains except the few puny specimens of a younger generation which have managed to survive destruction in the deeper swamps along North Branch, Little Blackwater River, Glade Run, and in the Stony River Valley area.

Today Canaan Valley is a great, damp meadow with few trees anywhere — a great wilderness of glade and open mossy bog, grassland and brush, with hundreds of heads of steers wandering over an immense pasture land.

The Stony River Valley high up beyond the lofty Cabin Mountain rim is even more desolate with rocks, briars, fireweed (*Epilobium angustifolium* L.), brush, brake (*Pteridium aquilinum* (L.) Kuhn. var. *latiusculum*, (Desv.) Underw.) and hayscented fern (*Dennstaedtia punctilobula* (Michx.) Moore), and an invading fire-subclimax growth of poplar (*Populus tremuloides* Michx., and *P. grandidentata* Michx.), bird cherry (*Prunus pensylvanica*), mountain holly (*Ilex monticola* T. & G.), and many others.

The Vegetation Today. The destruction of the superb coniferous forest of the Canaan Valley region and elsewhere in the area was remarkably thorough. Unlike the hardwoods these conifers never produce a sprout forest. In the Canaan Valley itself no large representative of the original climax forest has survived, and scarcely a handful of lineal descendants of spruce or fir are to be seen here, these being confined to the wet, alluvial water courses. Every effort was made by cutting, fire and even cultivation to convert the less rocky Canaan lowlands and large areas of the slopes of Cabin Mountain into grassland.

Figure 9—Top of knob (Pottsville ledges) north of Dobbins Slashings, showing great spruce stumps and roots now resting upon the rocks, formerly buried in deep masses of humus and moss.

After the forest had been cut and its debris and all the humus layers destroyed by drying and by fire, thousands of pounds of mixed grass seed were brought in and sowed over the drier exposed soils of the area. At one time or another crops of potatoes or other vegetables were attempted on a large scale on some of the better soils near Glade Run. None of those efforts gave an adequate return, and all traces of these temporary cultural communities have disappeared.

There are hundreds of acres of excellent sandy loam soils in the area, but markets are far away and the area is too inaccessible to make such agricultural ventures pay.

It is obvious even to the layman that a new order of vegetation succeeded the coniferous type. The presence on every hand of such plants, sun-loving forbs, as the beautiful bull thistle (*Cirsium pumilum* (Nutt.) Spreng.), everlasting (*Anaphalis margaritacea* (L.) C. B. Clarke), hawkweeds (*Hieracium aurantiacum* L., *H. pratense* Tausch.), and many others, bears witness to these changes. None of these plants would have tolerated the wet, boggy, shaded, sphagnum-covered spruce – rhododendron forest where conditions of more or less hydrophytism prevailed.

In place of the tame grasses, timothy, orchard grass, red top and the clovers, the wild oat grasses (*Danthonia*) have gained the ascendancy and dominate great areas on the better upland soils. In the less elevated, wetter, more marshy areas, wide stretches of hair-cap moss (*Polytrichum*), broken by patches of sphagnum in the more boggy depressions, occupy the ground. In August these bogs become conspicuously whitened with almost pure stands of cotton grass (*Eriophorum virginicum* L.) (Fig. 2).

In late summer acres of bulrush (*Scirpus cyperinus* (L.) Kunth var. *pelius* Fernald), control other boggy habitats, contributing an even stratum of gray-brown hue to the distant view. There is rank vegetation everywhere, but it is of the bog and prairie sort depending upon the soil moisture conditions.

On the drier knolls wild oat grasses (*Danthonia spicata* (L.) Beauv., and *Danthonia compressa* Aust.) dominate many areas on the deeper Mauch Chunk soils, extending far up the Cabin Mountain (Fig. 1). High up the drier, colder, rocky crests of the mountain rim, where spruce once flourished, the *Danthonia* species become less prominent, and today an extensive development of *Carex* sod appears, including chiefly *Carex foena* Willd., *C. brunnescens* (Pers.) Poir., and *C. debilis* Michx. var. *rudgei* Bailey. This *Carex* growth

is less subject to disturbance by the wandering stock, for it is not as palatable as the choicer grasses found on the lower slopes.

Native weedy plants appear everywhere, including chiefly fireweed (*Epilobium angustifolium*), bull thistle (*Cirsium pumilum*), brake (*Pteridium aquilinum* var. *latiusculum*), hay-scented fern (*Dennstaedtia punctilobula*), everlasting (*Anaphalis margaritacea*), cudweed (*Gnaphalium macounii* Greene), goldenrods (*Solidago graminifolia* (L.) Salisb., *S. uliginosa* Nutt., *S. rugosa* Ait.), aster (*Aster umbellatus* Mill.), hawkweeds (*Hieracium aurantiacum*, *H. pratense*), buttercup (*Ranunculus acris* L.), and ox-eye daisy (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq. & Lamotte).

Throughout the season there is a ceaseless change of aspect as one assemblage or another of these colorful weeds dominates the landscape. In early midsummer the yellow and gold of the buttercups and the hawkweeds intermingled with the white of field daisies brightens the landscape. This is succeeded by the more plethoric, tumultuous, elevated gold of the goldenrods, the solid purple of the bull thistle, and the almost glistening snowy whiteness of the everlasting.

The senior writer has seen miles of brake breast high on some of the better uplands on the Canaan Valley floor. On the steeper, more rocky upper slopes of the Cabin Mountain knobs, great areas of hay-scented fern together with briars and brush, representing the earlier stages of a temporary fire subclimax, have intervened.

A biotic factor, represented by hundreds of head of grazing stock, is now producing great modification in the grass and weed successions which naturally established themselves following the complete destruction of the spruce forest.

These animals by their highly selective feeding upon the finer grasses, and their avoidance of the ranker less palatable forbs, including the thistles, goldenrods, asters, everlasting and others, are tending to restrict the grasses and to favor the extension of the latter. In some areas this has amounted to excessive grazing, and the forbs have correspondingly increased. On the higher, more rocky ridges, the latter completely control the situation.

In the low grounds along the streams the introduced beaver has produced profound changes where he has built his dams and deeply flooded the lowlands, so that much young spruce and large areas of fringing alders have been destroyed by high-water levels (Fig. 10).

This region, however, is naturally adapted to a forest climax, and the weedy prairies and coverings of briars and brush which have succeeded the coniferous climax are but temporary associations induced by a more mesophytic or xerophytic habitat resulting from cutting and fire.

If further disturbance did not intervene, forest would again return, as it is so doing at the present time, but it could not be a woodland similar to the original coniferous forest for many centuries, if ever such a forest returned.

Figure 10—Looking east from beaver dam in Big Cove; Cabin Mountain in background. The swamp created by the beaver dam is littered with dead trees, killed by the flooding of the area. All the alders, spruce and other trees are dead as a result. Interrupted fern in the foreground.

The few spruce seedlings which have appeared seem unthrifty in some localities, and many of the finer specimens along the water courses in the Canaan Valley at present are very rapidly dying, either as a result of flooding by beavers introduced here years ago or as a result of insect injury or disease. This condition has become most noticeable in the swamps along the headwaters of the Little Blackwater River in Big Cove, within the last year.

On the high and very rocky lands in the Stony River Valley, where it has not been practicable to attempt agricultural development, briars and brush are much more rampant, and likewise in this area a much more general sprinkling of vigorous young spruce trees occurs. These more hopeful conditions of reforestation apply also to the Dobbin Slashings area.

Naturally, then, forest will again succeed the grass, sedge and weedy stages, and this will be forest composed of the few broad-leaved species best adapted to this cold region. The dominant trees of this group are beech, hard maple, yellow birch, wild black cherry, white ash, basswood, and hemlock.

A fire succession quickly develops and has already asserted itself in some portions of the Stony River area, comprising mainly the species *Populus grandidentata, Populus tremuloides, Prunus pensylvanica, Prunus virginiana* L., *Ilex monticola* and others.

Splendid, secondary, broad-leaved deciduous forest has already succeeded the spruce climax on the slopes of Brown mountain, in Big Cove, and in other small areas of Canaan Valley and the west slope of Cabin Mountain. In many places the dominant trees of the forest crown are maple and beech, with varying proportions of wild black cherry and yellow birch. Some of these stands consist almost entirely of hard maple.

Figure 11. Large, hollow hemlock stump on knoll near Little Blackwater River in the Canaan Valley. Stump is 7 feet across as shown by the tape, the longest diameter.

These secondary woods have been exceptionally closely planted by the natural forces of forest regeneration, so that tall slender boles have carried the dense leaf canopy high above the ground and created an extremely heavy shade beneath. Very low light intensities prevail in these damp forests in summertime, and even with a bright sun, the light intensity at midday may be as low as 6-8 foot candles. These

low light intensities would unquestionably exclude the rhododendron understory from such dense deciduous forests, whereas the spruce climax with its isolated and tapering spires has afforded optimum light conditions for a dense rhododendron understory.

During the frequent fogs and storms which are of common occurrence in this region the light intensities in these dark forests must fall below the photosynthetic requirements of all the vascular plants for considerable periods, and this would be especially true on steep north-facing slopes. Only the most shade-tolerant plants can establish themselves under these low intensities. The grass, *Milium effusum* L. confines itself to these woods, and the ferns, *Dryopteris spinulosa* (O. F. Muell.) Watt var. *intermedia* (Muhl.) Gray, *Athyrium filix-femina* (L.) Roth var. *asplenioides* (Michx.) Farw., *Dryopteris noveboracensis* (L.) A. Gray, *Athyrium thelypterioides* (Michx.) Desv. and a few others grow here. There is a striking lack of herbage in these dimly illuminated woodlands, and the layers of mosses and liverworts, low herbs, tall herbs and shrubs, so characteristic of the more open deciduous woods of the Piedmont, are quite lacking here.

One plant known as ramps (*Allium tricoccum* Ait.), flourishes in these dark forests, and frequently occurs in enormous numbers. This onion produces its few large leaves in very early spring. After these die, by early summer, they are followed by the naked flower stalks in July. The heaviest shade is no detriment to the success of this plant since the period of photosynthesis of the leafage is carried on in early spring and summer before the mature, heavy, midsummer leaf canopy of the trees in these deep woods has developed, and the demands of the blossoms are supplied by the reserves of foods stored in the strong bulbs.

Many years ago ramps were much prized as food, and old timers speak of picnics and festivals that were often organized by the people of the town of Davis and other centers to collect these onions in the mountains around. A ramp eater, however, usually advertises himself rather unpleasantly to others by his strong garlic emanations, and with the evolution of a more genteel and fastidious social atmosphere, which the finer garden onions favor, ramp eating appears to be little indulged in at the present time.

In a few places small groves of fine tall black cherry trees have developed, and it is obvious that the soil and climatic conditions of the Canaan Valley are highly favorable to this species.

The red maple is scattered over the entire area, and some of the natives hold that it is more abundant now than formerly. The senior writer is of the opinion that here it is a member of the fire subclimax rather than of the maple – beech – yellow birch association.

As previously stated the oaks and hickories are entirely wanting in the spruce area, as also are *Liriodendron tulipifera* L., *Magnolia acuminata* L., *Sassafras albidum* (Nutt.) Nees, *Robinia pseudo-acacia* L., and all other members of the mixed deciduous forest appearing everywhere as one approaches or descends the Allegheny Front.

It is a strange experience to leave the splendid mixed forests below the Allegheny Front or even just without the spruce belt with their great assortment of trees, shrubs and vines, and enter a region so close by where most of these are lacking, and replaced by forests almost entirely of beech and maple.

One cannot but feel that many of the oaks and other trees would grow here were they introduced following the removal of the coniferous forest. This seems probable from the fact that nearly pure stands of dwarfed red oak grow on the wind-swept northern slopes

Figure 12. White flowers of *Cirsium pumilum* (Nutt.) Spreng. forma *candidum* Fern., more or less abundant on the floor of the Canaan Valley between Glade Run and the Little Blackwater River. The purple form also grew here.

of Elliott Knob in Augusta county, Virginia, at about 4,000 feet, where they experience climatic conditions perhaps as severe in some respects as in the Canaan Valley region.

It has been observed that in some areas very sharp boundaries separated the great spruce forests from the broad-leaved associations in this region. Some of the old woodsmen have remarked that the two met at a line, but this observation would probably need further clarification. It is unquestionably true, however, that sharp ecotones did exist between the two forest types, and the senior writer is inclined to believe that slight differences in altitude did not entirely explain the segregations.

It is obvious, to say the least, that climatic conditions were near optimum for the primeval spruce complex found here, which included a very dense rhododendron understory. This rather unique association may have had much to do with the establishment of sharp ecotones between the coniferous and the broad-leaved assemblages. It was a forest cover which favored the highest degree of mesophytism or even hydrophytism, and enforced the great reduction in light intensity, which only water-loving liverworts and mosses could tolerate. It was then a habitat, quite unsuited for seedling oaks, hickories and other such light-demanding trees but highly suited to fir, spruce and hemlock, which, even upon the rockiest terrain, can, under favorable climatic conditions, build up deep accumulation of acid humus and moss coverings.

It is not improbable, therefore, that this great spruce — rhododendron association, within its proper climatic zone, may have been able to capture ground from the broad-leaved associations, or at least to establish a habitat where narrow ecotones would obtain.

FLORISTICS

The senior writer has collected very extensively in the region of the Canaan Valley, Stony River Valley, and on the adjacent rocky mountain rims. There is not a stream nor swamp in the area which has not been penetrated and followed to its end.

The swamps here afforded by far the best collecting grounds for rare native species, since this habitat has suffered less disturbance, and the original vegetative covering in many places has been fairly well preserved.

Before the climax spruce forest had been destroyed, the soil was largely an immature one deeply buried in incompletely decayed vegetation debris and overspread with a wet moss cover. On the original forest floor conditions approaching near or actual hydrophytism prevailed and the removal of the organic cover wrought pro-

found changes. The destruction of this organic cover induced highly xerophytic conditions in many places. The changed conditions profoundly affected the drainage streams and great fluctuations in the volume of stream flow now accompany the rains and dry periods.

The soils and root environment of the plant life of the original forest was characterized by very low pH values and was therefore highly acid. This condition alone would exercise a highly selective influence upon many plants which prefer near neutral soils and a high lime content.

The senior writer, using a convenient portable Truog soil testing equipment, has made studies of the pH values in various habitats. In the cold swamps where more natural conditions prevail pH values are very low. In the grassy uplands which have approached an agricultural stage, the soils have become near neutral on the best loam lands.

Determinations made in June in Big Cove, near the headwaters of the Little Blackwater River, in cold, wet swamp soils covered with spruce, fir, and rhododendron, indicated a rather general condition with pH values in the wet, humus layers of 4.00 to 4.5, and also in the sticky yellowish clay soil beneath derived from the Mauch Chunk Series. Although small local areas varied toward much higher values, these cold, immature soils on the whole are intensely acid. Yet in these soils some of the rarest plants thrive, including the beautiful and distinctive *Arisaema stewardsonii*, *Caltha palustris*, *Polemonium Van-Bruntiae* Britt., *Gaultheria hispidula*, *Gentiana linearis* Froel., *Aster tardiflorus* L., *Aster novi-belgii* L., and many others.

Wherever half-decayed humus accumulates, and light and air are excluded by a dense vegetation cover of trees, the pH appears to become normally low.

Tests were made in an exceedingly dense, dark, moist dominantly hard maple forest representing a secondary succession, and very low pH values were found throughout.

The vegetable detritus in this forest was sparse, but the thin, fibrous, black humified layer revealed a pH of 4.5, falling to near 4.00, 4 to 5 inches deeper in a very gritty, sandy, yellow loam. It is evident, then, that the swamp and woodland plants of this region must be able to tolerate extremely acid soils.

The following list of plants is not complete, but it probably contains the majority of the more striking species. Intensive collecting from year to year would surely add many other species, but to

work over an area as large and as diversified in soil and altitude as this area would require many years of arduous collecting at all growing seasons of the year. However, enough has already been done to show that the flora, like the coniferous climax itself, is more northern than southern in its affinities. Intensive collecting has already revealed a number of plants growing here that have not previously been reported from West Virginia, thus extending their occurrence far south of their hitherto known northern range.

The plant life of the Canaan Valley seems particularly restricted in some respects, and it is doubtful if this feature of the floristics is entirely governed by climatic severity. Many plants occur in the deciduous belt nearby just beyond what originally was the spruce belt, that do not yet occur in the Canaan Valley region. The senior writer believes that many of these species would thrive here were they now introduced. It can be readily understood why they were naturally excluded so long as the spruce-rhododendron climax held the ground, converting it into a cold, dark, near hydrophytic habitat with their evergreen foliage and the great accumulations of slowly decaying vegetable debris and wet moss covering. Even though more or less mesophytic or xerophytic meadow and pasture conditions have supplanted the habitat of the spruce forest, the densely forested or brush-covered mountain rim probably acts as a rather efficient barrier to the migration of many old field species that one would expect to find here.

Specimens of practically all the plants listed have been deposited in the collections of the U. S. National Herbarium, and in the Herbarium of West Virginia University.

The writers wish to acknowledge great help in the identification of much of the material by numerous specialists. Among these are William R. Maxon who checked or identified the ferns and lycopods; Mrs. Agnes Chase who has identified the grasses; Dr. F. J. Hermann who has identified the sedges and Juncaceae; Dr. S. F. Blake who has checked or identified many of the Compositae; Dr. C. R. Ball who has identified the willows; Dr. Francis W. Pennell who has named the *Chelone* species; and Dr. W. C. Muenscher who named *Potamogeton* and some other water plants. The nomenclature of most of the plants listed, has been made to conform with that of the new Gray's Manual of Botany, 8th. edition.

The list of plants following, collected by the senior author, has particular reference to the area formerly dominated by a climax

forest consisting mainly of spruce, hemlock and some fir, together with stands of beech and maple in certain habitats. This area has an altitude above 3,000 feet for the most part. A deciduous hardwood forest was dominant in the lower area, characterized by various species of oaks, *Magnolia acuminata*, *Liriodendron tulipfera*, and many other trees, shrubs and herbaceous plants of lower altitudes, at present rare or absent in the Canaan Valley area proper. Following the complete destruction of the coniferous forests, it would appear that the deciduous elements have shown tendencies to extend into the territory dominated formerly by these coniferous forests. This is perhaps to be expected since the complete destruction of the thick, wet beds of raw humus has resulted in warmer, drier, exposed mineralized soils. Many additional plants, among these many herbaceous species, prefer the original deciduous forest area, but do not find the higher, colder Canaan region beyond the Allegheny Front entirely suited to their requirements.

Among these, the plants named below as occurring near Seneca, and along Red Run and Dry Fork between Red Run Post Office, Hendricks, and Parsons, were collected by the senior author in July and August, 1945.

Andropogon Gerardi Vitman. In moist soil along Red Run near Hendricks.

Muhlenbergia tenuiflora (Willd.) BSP. Along the Dry Fork road to Hendricks.

Allium cernuum Roth. On shale bank near Seneca on the Davis-Seneca Highway. Flowers much deeper purplish red than usual.

Berberis canadensis Mill. On wooded bank along Elk Lick near Parsons.

Sedum ternatum Michx. On steep banks and soils on limestone area near Hendricks.

Astragalus canadensis L. On steep, dry rocky banks on Dry Fork near Hendricks: occasional.

Desmodium canadense (L.) DC. On roadside near Red Run Post Office, and on limestone banks near Hendricks. Very showy with its large purple flowers.

Desmodium paniculatum (L.) DC. Near Laurel Run trail on Dry Fork near Hendricks.

Euphorbia lathyris L. Roadside near Seneca on Davis-Seneca highway.

Impatiens pallida Nutt. In moist soil near Elk Run on Dry Fork road to Hendricks.

Impatiens pallida Nutt. f. *speciosa* Jennings. With the species above. Flowers very pale cream in color. Willard N. Clute in 1904 named the cream-colored form of this species var. *alba* (Amer. Bot. 7: 66-67, 1904). Later O. E. Jennings found the cream-colored form and thinking it was different from the white-colored form of Clute, named it forma *speciosa*, in his note "Impatiens pallida forma speciosa, f. nov." (Ohio Jour. Sci. 20: 204, 1920). Since the material found by the senior author is a mere color form, not a variety, and Jennings' name being the first to designate the plant as a forma, this name must be used for it.

Vitis vulpina L. On Laurel Run trail on Dry Fork road to Hendricks.

Gaura biennis L. Roadside along Dry Fork near Hendricks.

Aralia racemosa L. Near Hendricks on Dry Fork road.

Angelica venenosa (Greenway) Fern. Along Red Run near Hendricks.

Cicuta maculata L. Along Red Run near Hendricks.

Thaspium barbinode (Michx.) Nutt. Wooded bank on Elk Lick near Parsons.

Asclepias incarnata L. Bog on Dry Fork road near Hendricks.

Phlox paniculata L. In moist soil in thicket along Red Run near Hendricks. Variable in color.

Phlox maculata L. Growing with the preceding along Red Run near Hendricks.

Agastache scrophulariaefolia (Willd.) Ktz. Thicket near Hendricks.

Collinsonia canadensis L. Rich woods near Hendricks.

Monarda clinopodia L. Near Mill Run on Dry Fork road to Hendricks.

Campanula americana L. Very abundant and showy along roadside from Red Run Post Office to Hendricks.

Lobelia cardinalis L. In bogs near Elk Run, near Hendricks and elsewhere below the spruce zone.

Actinomeris alternifolia (L.) DC. Waste ground near Red Run Post Office; common at lower elevations.

Aster divaricatus L. In woods near Elk Run on road to Hendricks.

Cacalia atriplicifolia L. In thicket near Hendricks on Dry Fork road.

Cirsium altissimum (L.) Spreng. In roadside thicket on Dry Fork near Hendricks; infrequent.

Heliopsis helianthoides (L.) Sweet. Near Red Run Post Office on road to Hendricks. Very abundant and showy at the lower elevations. Some of these plants have rather rough leaves above, and tend toward var. *scabra* (Dunal) Fern.

Polymnia uvedalia L. Moist soil in ravine near Hendricks, on Dry Fork road.

None of these plants has been found in the much higher spruce area formerly extending from Davis to Thomas and eastward to the Stony River Dam area. They appear to be non-existent in most of the area between Dobbin Ridge and the Stony River Dam territory, including all the Canaan Valley area which lies between Canaan Mountain and Brown Mountain, and the Cabin Mountain ridges and knobs west and south.

LIST OF PLANTS

Found chiefly in the Canaan Mountain area, the Canaan Valley, and the Cabin Mountain-Stony River Dam area.

Osmundaceae

Osmunda claytoniana L. Common in moist, rocky wooded ravines and swamps. No specimens collected.

Polypodiaceae

Athyrium felix-femina (L.) Roth var. asplenioides (Michx.) Eaton. In heavy maple woods west of Glade Run.

A. thelypteroides (Michx.) Desv. In heavy maple-beech woods on slope of Cabin Mountain east of Glade Run.

Dennstaedtia punctilobula (Michx.) Moore. Everywhere, covering great areas on the drier rockier slopes, but cannot enter the heavy shade of the maple-beech woods.

Dryopteris cristata (L.) Gray. In cold wet soil near burning bog pile northwest of Davis. Among sandstone cliffs on the west of Cabin Mountain east of Glade Run.

Dryopteris simulata Devenp. In bogs in Glade Run Swamp near Burley's Camp.

D. SPINULOSA (O. F. Muell.) Watt var. INTERMEDIA (Muhl.) Underw. In deep shade of maple woods west of Glade Run.

D. SPINULOSA (O. F. Muell.) Watt var. FRUCTUOSA (Gilbert) Trudell.

D. NOVEBORACENSIS (L.) A. Gray. In dense maple woods west of Glade Run.

D. PHEGOPTERIS C. Chr. In Blackwater Canyon behind the falls at the foot of Pendleton Run.

D. SPINULOSA (O. F. Muell.) Watt. In dense spruce-fir-rhododendron growth in swamp on Glade Run.

ONOCLEA SENSIBILIS L. In damp soil throughout.

POLYPODIUM VIRGINIANUM L. On cliffs of Canaan Mountain at 3700 ft.

PTERIDIUM AQUILINUM (L.) Kuhn var. LATIUSCULUM (Desv.) Underw. Everywhere; covers square miles in pure stand in places in the Canaan Valley growing nearly shoulder high in places. No specimens collected.

EQUISETACEAE

EQUISETUM ARVENSE L. In damp soil along Glade Run.

LYCOPODIACEAE

LYCOPODIUM ANNOTINUM L. On wooded bank at Beaver Dam in Big Cove and on Brown Mt. slope.

L. CLAVATUM L. In rocky, brush-covered habitation top of Cabin Mountain east of Glade Run.

L. COMPLANATUM L. var. FLABELLIFORME Fern. In secondary succession of heavy maple woods; widespread.

L. INUNDATUM. L. Abundant in the sterile, wet, white, sandy soil in the sand pit near Thomas, making a second record for this northern species in West Virginia. It was first reported in West Virginia in "The Pteridophytes of West Virginia" by Brooks, M. G. and A. S. Margolin, West Virginia University Bull. Ser., 39, No. 2, 60 p., Morgantown, 1938. This report was based on its discovery by E. L. Core, who found it in Gum Springs Bog near Morgantown, Monongalia Co. (Castanea 4: 7-8, 1939). This species was soon found in Virginia also, where E. T. Wherry recognized it for the first time in Kelley Flats along Big Stony Creek, in 1939. This was reported in "Botanical Conference and Foray at Mountain Lake and vicinity," by A. B. Massey (Castanea 4: 136-137, 1939.) While several varieties occur

in Virginia, no varieties have as yet been reported from West Virginia. It is now known from two counties in West Virginia, i. e., Monongalia and Tucker.

L. OBSCURUM L. In rocky ravines on west slope of Cabin Mountain.

L. OBSCURUM var. DENDROIDEUM (Michx.) D. C. Eaton. In secondary heavy maple wood southwest of Glade Run.

L. TRISTACHYUM Pursh. At Dobbin Slashings and elsewhere in the area; frequent.

PINACEAE

ABIES BALSAMEA (L.) Mill. Now confined to the swamps along Glade Run, Little Blackwater River and elsewhere. Interspersed with spruce and hemlock; formerly in the coniferous complex, more especially in the wetter swamps.

PICEA RUBENS Sarg. Formerly the dominant forest tree in the area.

PINUS PUNGENS Lamb. The only record for this pine is an individual on the drier highlands east of Davis and not far from the former site of Camp 70; very scarce in this area.

TSUGA CANADENSIS (L.) Carr. Formerly an important constituent of the coniferous climax, and the largest growing tree in the area; now infrequent in the secondary successions.

The senior writer believes he saw a larch, LARIX LARICINA (Du Roi) K. Koch, in this area several years ago, but has not since located it. This tree has been recorded in nearby regions of West Virginia and probably occurred very sparsely in the primeval coniferous climax here.

TAXUS CANADENSIS Marsh. In cold, wet bog near Douglas.

TYPHACEAE

TYPHA LATIFOLIA L. Common in swamps and bogs throughout.

SPARGANIACEAE

SPARGANIUM AMERICANUM Nutt.[1] In Glade Run and other points in the Canaan Valley.

[1]Identified by Dr. W. C. Muenscher as the sterile form of **Sparganium americanum.** Fruiting material of this species has not yet been found anywhere in this area. The writers had considered this possibly **Vallisneria americana** Michx. The lack of fruiting material leaves this plant somewhat open to question until this can be found. A peculiar feature of the behavior of this plant is its occurrence in the deepest water of the streams where it is completely submersed.

S. CHLOROCARPUM Rydb. In bogs along Glade Run.

NAJADACEAE

POTAMOGETON EPIHYDRUS Raf. Submerged in Glade Run near Burley's Camp

P. EPIHYDRUS Raf. var. NUTTALLII (C. & S.) Fern. In Glade Run in a few locations.

GRAMINEAE

AGROPYRON REPENS (L.) Beauv. At Burley's Camp on Glade Run.

AGROSTIS ALBA L. Along old lumber railroad beds in open situations on west slope of Cabin Mountain, around Burley's Camp and elsewhere in pastures.

A. HYEMALIS (Walt.) B.S.P. On knolls and in uplands near Cabin Mountain; infrequent.

A. PERENNANS (Walt.) Tuckerm. In moist soil along streams; frequent.

A. TENUIS Sibth. In pasture on Glade Run near Burley's Camp. Everywhere in old wood roads, along the Blackwater River on Canaan Mountain. Panicles soft, fluffy, pink, and very attractive.

BROMUS CILIATUS L. Along the Blackwater River just east of Davis, Tucker Co. and in swamp at head waters of the Blackwater River near Cabin Mountain.

B. COMMUTATUS Schrad. In damp soil on slope of Cabin Mountain near Glade Run.

BRACHYELYTRUM ERECTUM (Schreb.) Beauv. In densest shade of young maple-beech wood on slope of Cabin Mountain near Glade Run.

CALAMAGROSTIS CANADENSIS (Michx.) Nutt. In wet, swampy locations near the beaver dam. The purplish panicles make it very attractive.

CINNA ARUNDINACEA L. In dark, shaded maple-beech-cherry woods east of Glade Run near the Little Blackwater River.

C. LATIFOLIA (Trev.) Griseb. Near the top of Snow Mountain at 4,000 feet.

DANTHONIA COMPRESSA Aust. Everywhere a common species in the drier pastures here.

D. SPICATA (L.) Beauv. In upland situations throughout the area; the most abundant grass in the area, except on the highest peaks of the Cabin Mountains.

DESCHAMPSIA FLEXUOSA (L.) Trin. In Blackwater Canyon near foot of Pendleton Run.

Echinochloa crus-galli (L.) Beauv. On old railroad grade near old Camp 70 east of Davis 3 miles.

Elymus riparius Wieg. In moist soil along streams; frequent.

E. virginicus Wieg. In low ground along the Blackwater River at Davis.

E. virginicus var. glabriflorus (Vasey) Bush. In thicket along the Blackwater River across from Davis.

Eragrostis capillaris (L.) Nees. Along the Western Maryland railroad in the Blackwater Canyon near Manway 3 below Douglas.

Glyceria canadensis (Michx.) Trin. In bogs at various stations the Blackwater River near Davis.

G. laxa Scrib. Along Glade Run, and along the Blackwater River near Davis.

G. grandis S. Wats. In swamp along Glade Run.

G. melicaria (Michx.) F. T. Hubb. In bogs at the upper beaver dam on the Blackwater River and along the Little Blackwater.

Holcus lanatus L. In upland situation near Glade Run; casual.

Hordeum jubatum L. In bog west of Burley's Camp on Glade Run; infrequent here.

Leersia oryzoides (L.) Swartz. In bogs along the Blackwater River across from Davis.

Milium effusum L. At the spring in woods near Cooper's Camp, north of the beaver dam on the Blackwater River; infrequent.

Panicum meridionale Ashe var. albemarlense (Ashe) Fern. On dry cinders of old lumber railroad north of Glade Run.

P. capillare L. In cinders of old lumber railroad grade near Davis.

P. clandestinum L. Very abundant in damp soil on old lumber railroad beds near Davis and elsewhere.

P. lanuginosum Ell. var. fasciculatum (Torr.) Fern. In bog near the upper beaver dam; in damp soil around Stony River Dam, frequent.

P. lanuginosum Ell. var. lindheimeri (Nash.) Fern. Along the Blackwater River at Davis; near the iron bridge here.

Phalaris arundinacea L. An escape near Davis.

Poa alsodes Gray. In woods on east slops of Bearden Knob at 3600 feet.

P. annua L. Near Burley's Camp on Glade Run.

P. cuspidata Nutt. In wet soil in swamp in Big Cove near the beaver dam.

P. PALUSTRIS L. In open ground at the top of Snow Mountain in the Cabin Mountain Range at 4,000 feet, and along the Blackwater River at the Blackwater Falls near Davis.

P. PRATENSIS L. on knob of Canaan Mountain at 3900 ft., near Davis.

CYPERACEAE

CAREX AESTIVALIS M. A. Curtis. In maple grove on slope of Cabin Mountain near Glade Run.

C. ARTITECTA Mackenz. On sandstone outcrop near Bearden Knob.

C. BAILEYI Britton. In wet, boggy soil at the beaver dam on the Blackwater River, and in wet soil on Glade Run.

C. BLANDA DEWEY. In dense, shade deciduous woods on the slope of Brown Mountain.

C. BRUNNESCENS (Pers.) Poir. In wooded swamps; frequent.

C. CANESCENS L. var. DISJUNCTA Fern. In swamp near the upper beaver dam on the Blackwater River.

C. COMOSA Boott. In low ground along Glade Run and along the Blackwater River; frequent.

C. COMMUNIS Bailey. In dense, shaded woods on the slopes of Cabin Mountain and also Brown Mountain.

C. CONVOLUTA Mackenz. On Canaan Mountain S.E. of Davis.

C. DEBILIS Michx. var. RUDGEI Bailey. In moist soil along streams flowing into the Blackwater Canyon near Davis.

C. FOENEA Willd. On stony knobs of Cabin Mountain: abundant as the predominant herbage at 3,800-4,000 feet.

C. FOLLICULATA L. In damp soil near the Blackwater Canyon at Davis.

C. GRACILLIMA Schwein. In wet swampy wooded areas around the upper beaver dam on the Blackwater River.

C. GYNANDRA Schwein. In open bogs several miles east of Davis before reaching old Camp 70.

C. INTUMESCENS Rudge. In bogs everywhere; common.

C. LEPTALEA Wahl. In wet open bogs at the upper beaver pond on the Blackwater River near its head.

C. LEPTONERVIA Fern.[2] In dense shaded woods on the slopes of Brown Mountain above the head of the Blackwater River. New to West Virginia.

---

[2]Observations on some Virginia and West Virginia plants. H. A. Allard. Va. Jour. Sci. 2: 263-264. 1941.

C. LURIDA Wahl. In swamps along Glade Run.

C. PAUCIFLORA Lightf.[1] In sphagnum bog near Dolly Sods, near 4000 ft. Rare.

C. RADIATA (Wahl.) Dewey. Near spring in damp, swampy woods above the upper beaver dam on the Blackwater River.

C. SCABRATA Schwein. In dense, shaded woods on the slope of Brown Mountain near the head of the Blackwater River.

C. SCOPARIA Schkuhr. In open bogs at the upper beaver dam near the head of the Blackwater River.

C. STIPATA Muhl. In open bogs at the beaver dam mentioned above.

C. SWANII (Fern.) Mack. In damp soil just south of the above beaver dam, in Big Cove.

C. TRISPERMA Dewey. In wet bogs near old Camp 70 on the Blackwater River; very abundant in such situations here (alt. 3200 ft.).

C. VIRESCENS Muhl. In damp meadow on west slope of Bearden Knob.

C. VULPINOIDEA Michx. In swamps everywhere along Glade Run and in similar situations elsewhere; common.

DULICHIUM ARUNDINACEUM (L.) Britt. In bogs near the Blackwater River east of Davis 3½ miles; in the higher, colder habitats of the area.

ELEOCHARIS ACICULARIS (L.) R. & S. In mud on west shore of Stony River Dam.

E. OBTUSA (Willd.) Schultes. In mud along Glade Run; frequent.

E. TENUIS (Willd.) Schultes. In shallow pool on Cabin Mountain near Stony River Dam.

ERIOPHORUM VIRGINICUM L. Perhaps the most common sedge in the area fairly whitening the open bogs everywhere from the Cabin Mountain to the Brown Mountain slopes.

RHYNCHOSPORA ALBA (L.) Vahl. In cold mountain bog near Douglas.

SCIRPUS ATROCINCTUS Fern.[1] In swamps and bogs along all the streams.

S. ATROVIRENS Willd. In swamp near the upper beaver dam near the head of the Blackwater River.

S. ATROVIRENS Willd. var. GEORGIANUS (Harper) Fern. In wet soil on west slope of Cabin Mountain near Glade Run.

S. CYPERINUS (L.) Knuth. In west soil near beaver dam in Big Cove.

---

[1] Carex pauciflora in West Virginia. H. A. Allard. Castanea 16: 145. 1951.

S. CYPERINUS var. PELIUS Fern. Extremely abundant in all the open bogs in the area around Glade Run, the Little Blackwater River and the Blackwater River.

S. RUBROTINCTUS Fern.[4] In swamps and bogs along Glade Run; infrequent.

ARACEAE

ARISAEMA STEWARDSONII Britt. In deep, black muddy soil along the Blackwater River below the upper beaver dam; infrequent. A very distinctive plant, with little resemblance to the species *A. atrorubens* (Ait.) Blume.

A. DRACONTIUM (L.) Schott. In woods on Bald Knob.

JUNCACEAE

JUNCUS ACUMINATUS Michx. Along Glade Run, near Burley's Camp.

J. ARTICULATUS L.[5] Along the Blackwater River at Davis, and in water in the cellars of the dismantled paper pulp mills near the bridge. Pure stands grew in these cellars covered with 4-6 inches of water.

J. BREVICAUDATUS (Engelm.) Fern. In west soil along the Blackwater River near Davis.

J. CANADENSIS J. Gay. In cold bog on Canaan Mountain at 3500 ft.

J. EFFUSUS L. var. PYLAEI (Laharpe) Fern. & Wieg. In swamps along Glade Run and elsewhere.

J. EFFUSUS L. var. COMPACTUS Lej. & Court.[6] On west shore of Stony River Dam near 4,000 feet.

J. EFFUSUS L. var. SOLUTUS Fern. & Wieg. In damp soil on west slopes of Cabin Mountain near Glade Run. Some specimens of var. *pylaei* show an approach to var. *solutus*.

J. FILIFORMIS L. Along the Blackwater River near Davis, and near the Blackwater Canyon.

J. MARGINATUS Rostk. In damp soil near burning gob pile near coal mine entrance west of Davis.

J. TENUIS Willd. f. DISCRETIFLORUS (F. J. Hermann) Fern. In bogs on Glade Run near Burley's Camp.

---

[4]Three plants new to West Virginia. H. A. Allard. Castanea 7: 114-118. 1942.

[5]Castanea 8: 132, 133. 1943.

[6]Three plants new to West Virginia. H. A. Allard. Castanea 7: 114-118. 1942.

LUZULA ECHINATA (Small) F. J. Hermann. In pasture in Canaan Valley S.E. of Bearden Knob.

LILIACEAE

ALLIUM TRICOCCUM Ait. Very abundant in rich organic soils in the deepest deciduous woods throughout. Was formerly much eaten by the natives when onions were less abundant. Called ramps by many. The leaves appear before the flowers in very early spring, and before the heavy deciduus woods develop much shade; flowering occurs later after the leaves have gone.

CLINTONIA BOREALIS (Ait.) Raf. In damp woods at sand pit at 3100 ft.

C. UMBELLULATA (Michx.) Morong. In damp woods near Thomas.

LILIUM SUPERBUM L. Very abundant in the rich flood plain soil along the Blackwater River and very tall and showy here in thickets; some individuals develop much deeper red flowers than others.

SMILAX TAMNOIDES L. var. HISPIDA (Muhl.) Fern. In swamps along Glade Run, and on slopes of Cabin Mountain near Dobbins Slashings; local.

S. ROTUNDIFOLIA L. In sand pit near Thomas not far from the Fairfax Stone.

TRILLIUM ERECTUM L. forma ALBIFLORUM R. Hoffm. In wet, moss-covered soil in a bog 3 miles east of Davis.

T. UNDULATUM Willd. In rich woods at sandpit near Thomas.

ZIGADENUS LEIMANTHOIDES Gray. Damp soil in woods on Dolly Sods at 4,000 ft.

IRIDACEAE

SISYRINCHIUM ANGUSTIFOLIUM Mill. In pastures near Glade Run around Burley's Camp; frequent.

ORCHIDACEAE

HABENARIA CLAVELLATA (Michx.) Spreng. In sphagnum bog on Glade Run near Burley's Camp.

H. CRISTATA (Michx.) R. Br. Moist soil on Backbone Mt., near fire tower.

SALICACEAE

POPULUS BALSAMIFERA L. Near Stony River Dam in rocky soil. This is a remarkable record. The species has not formerly been found south of northern Pennsylvania.

SALIX CORDATA Michx. In swamp along Glade Run.

S. DISCOLOR Muhl. In the swamps along Glade Run and in similar situations elsewhere.

S. DISCOLOR Muhl. var. LATIFOLIA Anderss. In bogs along Glade Run.

S. DISCOLOR Muhl. var PRINOIDES (Pursh.) Anderss. In bogs and swamps along Glade Run.

S. HUMILIS Marsh. In damp soil in Big Cove near the beaver dam here.

S. HUMILIS Michx. var. RIGIDIUSCULA (Anderss.) R. & F. In dry soil in cinders in old lumber railroad bed near Stony River Dam.

S. RIGIDA Muhl. Along Blackwater River near Davis.

S. SERICEA Marsh. In various situations on the Cabin Mountain slope to the low grounds of Canaan Valley along Glade Run and elsewhere.

BETULACEAE

ALNUS RUGOSA (Du Roi) Spreng. var. AMERICANA (Regel) Fern. The only species here, and very abundant along Glade Run and other streams.

BETULA LUTEA Michx. f. A common constituent of the deciduous forest of the drier mountain slopes.

B. PAPYRIFERA Marsh. A single small fruiting tree near Stony River Dam. This is the second record for West Virginia. A very rare tree here.

CARPINUS CAROLINIANA Walt. var. VIRGINIANA (Marsh.) Fern.

FAGACEAE

FAGUS GRANDIFOLIA Ehrh. Near old lumber railroad grade on west slope of Snow Mountain at 3,500-3,600 ft.

F. GRANDIFOLIA Ehrh. f. PUBESCENS Fern. & Rehd. Abundant on the better drained mountain slopes everywhere. Formerly was found in nearby pure forests in some areas.

URTICACEAE

LAPORTEA CANADENSIS (L.) Wedd. In woods on west slope of Cabin Mountain near Glade Run.

ARISTOLOCHIACEAE

ARISTOLOCHIA DURIOR Hill. A large vine found in heavy woods on west slope of Cabin Mountain near Glade Run; the only specimen

seen. Common at lower elevations in the original deciduous area.

ASARUM CANADENSE L. In woods on west slope of Cabin Mountain near Glade Run.

POLYGONACEAE

POLYGONUM CILINODE Michx. In open rocky soil on west slope of Cabin Mountain, and very abundant. It may be low and bushy or high climbing.

P. HYDROPIPER L. In swamp at beaver dam on Glade Run south of Burley's Camp.

P. AVICULARE L. var. VEGETUM Ledeb. At Burley's Camp on Glade Run, at foot of the west slope of Cabin Mountain.

P. AVICULARE L. In open pastures and meadows near Glade Run; frequent.

P. PERSICARIA L. In open ground around Burley's Camp on Glade Run.

P. PUNCTATUM Ell. In wet soil at the beaver dam on Glade Run south of Burley's Camp.

P. SCANDENS L. In thickets near the upper beaver dam in Big Cove; abundant.

RUMEX CRISPUS L. In waste ground around Burley's Camp on Glade Run.

R. OBTUSIFOLIUS L. In waste ground around Burley's Camp.

CHENOPODIACEAE

CHENOPODIUM ALBUM L. At Burley's Camp in waste ground; infrequent here.

AMARANTHACEAE

AMARANTHUS RETROFLEXUS L. In waste ground at Burley's Camp on Glade Run.

AIZOACEAE

MOLLUGO VERTICILLATA L. In cinders in old lumber railroad bed near Glade Run; infrequent.

CARYOPHYLLACEAE

CERASTIUM TOMENTOSUM L. In yard at Davis.

C. VULGATUM L. var. HIRSUTUM Fries. (*C. vulgatum* of Am. authors). In cinders on old lumber railroad grade along Glade Run.

PARONYCHIA FASTIGIATA (Raf.) Fern. In cinders of old lumber railroad bed high up on the west slope of Cabin Mountain near Big Cove.

STELLARIA CALYCANTHA (Ledeb.) Bong. var. ISOPHYLLA Fern. On bank of Beaver Creek near old bridge at Davis.

S. GRAMINEA L. At Burley's Camp on Glade Run.

RANUNCULACEAE

ACTAEA PACHYPODA Ell. In rich deciduous woods on west slope of Cabin Mountain in Big Cove.

ANEMONE VIRGINIANA L. Near the Blackwater River at Davis.

CALTHA PALUSTRIS L. Very abundant in swamps along the Blackwater River, Glade Run and in similar wet situations elsewhere here.

CLEMATIS VIRGINIANA L. Abundant in low ground thickets along Glade Run.

HEPATICA ACUTILOBA D C. In heavy maple-beech wood on west slope of Cabin Mountain north of Burley's Camp. *Hepatica triloba* Chaix does not appear to occur in the area.

RANUNCULUS ACRIS L. Abundant in low ground meadows along Glade Run and elsewhere.

R. HISPIDUS Michx. In wet soil in Big Cove near the beaver dam here.

THALICTRUM POLYGAMUM Muhl. In damp soil on west slope of Cabin Mountain east of Burley's Camp.

TRAUTVETTERIA CAROLINENSIS (Walt.) Vail.. Frequent in thickets along the Blackwater River east of Davis.

BERBERIDACEAE

CAULOPHYLLUM THALICTROIDES (L.) Michx. In deep shade of maple-beech wood on west slope of Cabin Mountain, near Burley's Camp.

PAPAVERACEAE

ADLUMIA FUNGOSA (Ait.) Greene. In thicket along the Blackwater River across from Davis near Tank Stream. Climbs by twisting the leaf stalks around the support; very dainty and attractive; rare.

DICENTRA EXIMIA (Ker.) Torr. On Huckleberry Plains near Dolly Sods.

Cruciferae

Arabis canadensis L. In meadow beneath dense bracken cover east of Glade Run.

Barbarea vulgaris R. Br. In moist open ground near Burley's Camp on Glade Run.

Brassica campestris L. In waste ground around Burley's Camp.

Cardamine pensylvanica Muhl. Abundant in wooded swamps throughout.

Lepidium campestre (L.) R. Br. In cinders on lumber railroad bed with the preceding species.

Lepidium densiflorum Schrad. In cinders of old lumber railroad bed on Glade Run near Burley's Camp.

Rorippa islandica (Oeder) Borbas var. fernaldiana Butters & Abbe. In low ground along Glade Run.

Droseraceae

Drosera rotundifolia L. In cold bog near Douglas at 3,400 ft.; near Dolly Sods at 4,000 ft.

Saxifragaceae

Hydrangea arborescens L. In the Blackwater Canyon below Douglas.

Ribes cynosbati (L.) Mill var. glabratum Fern. On west slope of Cabin Mountain near Glade Run in deciduous woods.

R. glandulosum Grauer (*Ribes prostratum* L' Her of Gray.) On rocky ridges in Big Cove near the beaver dam.

R. rotundifolium Michx. In rich deciduous woods on west slope of Cabin Mountain near Glade Run.

Saxifraga micranthidifolia (Haw.) Britt. Wet bank on Backbone Mt. near Thomas.

Tiarella cordifolia L. On wooded slope of Cabin Mountain near Burley's Camp.

Rosaceae

Agrimonia gryposepala Wallr. On old lumber railroad grade on west slope of Cabin Mountain.

Crataegus macrosperma Ashe. In damp soil of Big Cove near the Blackwater River; becomes a good-sized shapely tree.

C. punctata Jacq. In swamps along Glade Run and in similar situations elsewhere. It is the common species and grows as large as an apple tree; ornamental.

DALIBARDA REPENS L. In ravine in deciduous woods on west slope of Cabin Mountain near Glade Run.

FRAGARIA VESCA L. In pasture on upper slope of Bald Knob.

GEUM ALEPPICUM Jacq. var. STRICTUM (Ait.) Fern. In moist ground near beaver dam in Big Cove.

G. CANADENSE Jacq. In maple-beech woods 2 miles west of Glade Run.

G. LACINIATUM Murr. In swamps along Glade Run and elsewhere.

PHYSOCARPUS OPULIFOLIUS (L.) Maxim. Along the Blackwater River near the site of old Camp 70.

POTENTILLA NORVEGICA L. Around Burley's Camp on Glade Run.

P. RECTA L. Near the old pulp mill ruins just east oft Davis; is frequent in the area.

PRUNUS PENSYLVANICA L. f. An abundant tree of the upland secondary successions everywhere. No specimens collected.

P. SEROTINA Ehrh. An abundant tree in the drier, deciduous forest areas, and an original constituent of the climax deciduous forests here. No specimens collected.

P. VIRGINIANA L. Very abundant near the swamps along Glade Run and elsewhere.

ROSA PALUSTRIS Marsh. Along the Blackwater River east of Davis; frequent.

PYRUS AMERICANA (Marsh) D C. Common throughout the region.

P. MELANOCARPA (Michx.) Willd. In open bogs along the Little Blackwater River.

P. FLORIBUNDA Lindl. Along old lumber railroad grade on west slope of Cabin Mountain near Dobbin Slashings.

SPIRAEA ALBA Du Roi. In low ground along Glade Run, the Blackwater River and elsewhere; very abundant in some localities, covering large areas.

RUBUS CANADENSIS L. Very abundant in thickets along the mountain slopes throughout. Fruit sweet, highly flavored, and some colonies seems worthy of selection. The stems may be entirely or almost free of prickles.

R. HISPIDUS L. In low boggy swales throughout; very common.

R.IDAEUS L. VAR. STRIGOSUS (Michx.) Maxim. Common on Bald Knob of the Cabin Mountain range.

R. HELLEBROSUS Focke. A colony discovered by Mr. H. P. Sturm of Clarksburg, West Virginia. The colony was growing on a steep bank beside the Lanesville road 2½ miles from the Davis-Seneca highway. Native of Japan, and the first record for West Virginia. Collected under the senior author's field number 11617.

R. ODORATUS L. In thickets near Red House and elsewhere in the area; not found in the Cabin Mountain area; prefers the habitat of the deciduous woodland areas.

LEGUMINOSAE

TRIFOLIUM AGRARIUM L. In open upland pastures on west slope of Cabin Mountain.

T. ARVENSE L. On lumber railroad bed on slope of Cabin Mountain near Snow Mountain. Legumes are scarce in the colder, wetter spruce forest areas.

GERANIACEAE

GERANIUM COLUMBINUM L. In thicket on Laneville road 2½ miles from the Seneca-Davis highway.

OXALIDACEAE

OXALIS EUROPAEA Jordan. In waste ground around Davis; frequent.

O. EUROPAEA L. CYMOSA (Small) Wieg. On old lumber railroad bed in Big Cove near the beaver dam.

O. EUROPAEA L. VILLICAULIS Wieg. In meadow across the Blackwater River from Davis.

O. FLORIDA Salisb. In open upland pastures near Burley's Camp on Glade Run.

O. MONTANA Raf. Common in damp woods on Canaan Mt. and on Bald Knob.

O. STRICTA L. Along old railroad bed 1 mile west of Davis.

POLYGALACEAE

POLYGALA SANGUINEA L. In cinders of old lumber railroad bed near site of Camp 70; infrequent.

EUPHORBIACEAE

EUPHORBIA CYPARISSIAS L. Around old ruins near Davis.

E. MACULATA L. In the dry soil along the Western Maryland Railroad several miles below Douglas.

E. PURPUREA (Raf.) Fern. Foot of Canaan Mt.

Callitrichaceae

Callitriche heterophylla Pursh. In muddy pools along Glade Run and elsewhere; frequent.

Aquifoliaceae

Ilex montana T. & G. Very abundant on the upper slopes of Cabin Mountain and elsewhere.

I. verticillata (L.) A. Gray. Frequent in low grounds in Big Cove along the Blackwater River and elsewhere in similar situations.

Nemopanthus mucronata (L.) Trel. In rocky situations along the Blackwater River near the Blackwater Canyon. Very beautiful with its crimson fruit on long pedicels; infrequent.

Aceraceae

Acer pensylvanicum L. In woods on the west slope of Cabin Mountain; frequent.

A. rubrum L. Abundant, and a common constituent of the secondary successions in the low ground spruce area; no specimens collected.

A. saccharum Marsh. Formerly a constituent of the upland climax forests everywhere, in some habitats producing sugar groves. Now a prominent constituent of the upland secondary forests everywhere, either in dense pure stands or with beech, yellow birch and others of this climatic zone.

A. spicatum Lam. Frequent in the deciduous woods on the west slope of Cabin Mountain.

Balsaminaceae

Impatiens capensis Meerb. Abundant in low grounds along Glade Run and elsewhere.

I. pallida Nutt. Along Elk Lick Run below Davis.

Vitaceae

Vitis aestivalis Michx. var. argentifolia (Munson) Fern. On ledges along old lumber railroad grade near site of Camp 70.

V. labrusca L. A single individual in a thicket near the site of Camp 70. Rare in the true spruce area.

Tiliaceae

Tilia neglecta Spach. A frequent tree on the west slope of Cabin Mountain and elsewhere.

Malvaceae

Malva moschata L. In open ground around Burley's Camp on Glade Run; infrequent, and the only station where it occurred.

Hypericaceae

Hypericum densiflorum Pursh. Along the Blackwater River near Camp 70; very abundant and showy in this area.

H. ellipticum Hook. In bogs near Gatzmer, along old lumber railroad bed; frequent.

H. mutilum L. In moist open ground along Glade Run; frequent.

H. perforatum L. Along Blackwater near Blackwater Falls.

H. punctatum Lam. In moist open ground along Glade Run; frequent.

H. spathulatum (Spach) Steud.. Along Blackwater River near Davis.

H. virginicum L. var. fraseri (Spach.) Fern. In swamps along Glade Run and elsewhere.

Violaceae

Viola blanda Willd. Near Tank Stream near Davis.

V. canadensis L. In woods on Backbone Mt. near Thomas.

V. cucullata Ait. In woods on Backbone Mt. near Thomas.

V. pallens (Banks) Brainerd. In bogs and damp situations; frequent.

V. rotundifolia Michx. In dense shade of maple-beech woods on Glade Run; frequent in such situations.

V. fimbriatula Sm. On dry lumber railroad bed in Big Cove near the beaver dam.

V. sororia Willd. In low ground in Bib Cove along the Blackwater River; abundant here.

Melastomaceae

Rhexia virginica L. In moist soil along Canyon Rim Truck Trail below Douglas.

Onagraceae

Circaea alpina L. In maple wood on Bald Knob.

Epilobium angustifolium L. Abundant in dry thickets; formerly burns.

E. COLORATUM Biehler. Abundant in swamp situations in Big Cove and elsewhere.

E. STRICTUM Muhl. In swamp along Glade Run.

E. GLANDULOSUM Lehm. var. ADENOCAULON (Haussk.) Fern. In low ground in swamps in Big Cove at beaver dam and elsewhere.

OENOTHERA BIENNIS L. Along Blackwater River near Davis.

O. BIENNIS L. var. NUTANS (Atkinson & Bartlett) Wieg. In Blackwater Canyon near Davis.

O. BIENNIS L. var. PYCNOCARPA (Atkinson & Bartlett) Wieg. At Burley's Camp on Glade Run; infrequent.

O. PERENNIS L. Frequent in low ground in pastures along Glade Run and elsewhere.

O. TETRAGONA Roth. var. LONGISTIPITATA (Pennell) Munz. In pasture on slope of Bald Knob at 3,000-4,000 ft.

ARALIACEAE

ARALIA HISPIDA Vent. Abundant on the dry, rocky crests of Cabin Mountain.

A. SPINOSA L. Frequent on the rocky terrain around Stony River Dam and elsewhere in similar situations near Davis.

UMBELLIFERAE

ANGELICA TRIQUINATA Michx. (*A. curtisii* Buckl.) A single colony near the bridge over the Blackwater River at Davis; rare in the area.

DAUCUS CAROTA L. Around Davis in waste ground; it was absent from the Canaan Valley proper between Brown and Canaan Mountains and Cabin Mountain.

OSMORHIZA CLAYTONI (Michx.) C. B. Clarke. In heavy shade of desiduous woods on west slope of Cabin Mountain; infrequent.

OXYPOLIS RIGIDIOR (L.) C. & R. Frequent along the Blackwater River near Davis. The so-called var. *ambigua* (Nutt.) Robinson is only an individual variation.

SANICULA MARILANDICA L. In deep shade of maple-beech woods on the west slope of Cabin Mountain near Burley's Camp.

CORNACEAE

CORNUS ALTERNIFOLIA L. f. On west slope of Cabin Mountain near Burley's Camp.

Ericaceae

Calluna vulgaris (L.) Hull.[3] In damp open situation on crest of Cabin Mountain near Snow Mountain. The only station found. Very beautiful in flower.

Erica tetralix L.[3] On the crest of Cabin Mountain not far from Snow Mountain. A single station. Very showy in bloom.

Gaultheria hispidula (L.) Bigel. In cold, wet sphagnum bogs all over the low ground between Cabin Mountain and Canaan Mountain. Very pretty with its edible spicy, snow-white berries.

G. procumbens L. Around outcrops at sand pit near Thomas, in very acid soil.

Oxydendrum arboreum (L.) D.C. Occasional in the Davis region.

Rhododendron arborescens (Pursh) Torr. At bottom of Blackwater Canyon at foot of Pendleton Run near Davis.

R. maximum L. Very abundant throughout the spruce forest area and formerly forming a dense shrub stratum in this forest.

R. viscosum (L.) Torr. Along the Blackwater River from Davis to the site of old Camp 70 and elsewhere.

Vaccinium angustifolium Ait. var. nigrum (Wood.) Dole. Near Dolly Sods at 4000 ft.

V. corymbosum L. var. glabrum Gray. In low ground near the Blackwater River in Big Cove; infrequent in the area.

V. erythrocarpum Michx. forma nigrum Allard.[5] On Blackbird Knob in the Cabin Mountain range.

V. macrocarpon Ait. In bog just south of Davis near the top of Canaan Mountain; infrequent in the area.

V. myrtilloides Michx. Abundant on bare, stony knobs of Cabin Mountain.

V. oxycoccus L. Occasional in cold sphagnum bogs along Glade Run.

V. vacillans Torr. On Cabin Mountain near Stony River Dam.

Primulaceae

Lysimachia ciliata L. In damp soil on west slope of Cabin Mountain near Glade Run.

L. quadrifolia L. near Davis. In damp woods along Blackwater River near Davis.

---

[3]Three plants new to West Virginia. H. A. Allard. Castanea 7: 114-118. 1942.

[5]Vaccinium erythrocarpum-forma nigrum-forma nova. H. A. Allard. Castanea 13: 127, 1948.

Oleaceae

Fraxinus americana L. Throughout the area; frequent.

Gentianaceae

Bartonia virginica (L.) BSP. On Dolly Sods Mt.

Gentiana linearis Froel. Very abundant in cold sphagnum swamps along Glade Run, the Blackwater River and other streams; very beautiful.

G. linearis f. blanchardii Fern. Flowers white with greenish tip. In bog on Canaan Mountain near the fire lookout tower. The only known locality in the area, and occurring with the species collected under the senior author's numbers 11488 and 11612.

Apocynaceae

Apocynum androsaemifolium L. Frequent in open situations in Big Cove and elsewhere.

A. cannabinum L. Frequent on crests of Cabin Mountain.

Asclepiadaceae

Asclepias exaltata L. Old field near Bald Knob.

A. incarnata L. Along Blackwater River toward Falls near Davis.

A. syriaca L. Abundant in pastures and open situations around Davis.

A. tuberosa L. In dry soil on old lumber grade 3½ miles east of Davis. The only plant seen in the area; common at lower elevations.

Convolvulaceae

Convolvulus arvensis L. Along the railroad at Thomas.

C. sepium L. In waste places and on dumps around Davis. Cultivated as a porch screen at Davis.

Cuscuta gronovii Willd. On herbage in swamps along Glade Run and elsewhere.

C. rostrata Schuttlw. On goldenrod and other herbs in damp situations throughout the area.

Polemoniaceae

Phlox paniculata L. In Canaan Valley near Canaan Mountain.

Polemonium van-bruntiae Britton. In swamps along Glade Run and elsewhere; abundant.

Hydrophyllaceae

Hydrophyllum canadense L. In woods on slope of Brown Mountain near Big Cove.

VERBENACEAE

VERBENA HASTATA L. In low ground along stream flowing into Glade Run near Burley's Camp.

LABIATAE

SATUREJA VULGARIS L. var. NEOGAEA Fern. On Bald Knob at 3000-4000 ft.

GALEOPSIS TETRAHIT L. In waste ground around Burley's Camp; infrequent.

LYCOPUS UNIFLORUS Michx. In a swamp along the Little Blackwater River west of Burley's Camp; infrequent.

MENTHA ARVENSIS L. In swamps along Glade Run and other streams here.

MEEHANIA CORDATA (Nutt.) Britt. At foot of Bald Knob in hemlock woods.

MONARDA DIDYMA L. In wet soil along Glade Run.

M. CLINOPODIA L. On Red Creek below along road to Hendricks.

SCUTELLARIA LATERIFLORA L. In damp woods along the Little Blackwater River west of Burley's Camp.

TEUCRIUM OCCIDENTALE Gray var. BOREALE (Bickn.) Fern. A single plant near the ruins of the pulp mill near the bridge at Davis. Collected under the senior author's field number 11482.

SCROPHULARIACEAE

CHELONE GLABRA L. Along the Blackwater in the Cabin Mountain range, and along Tank Stream below Davis.

C. GLABRA L. var. ELATIOR Raf. In swamps in Big Cove.

GRATIOLA NEGLECTA Torr. In wet soil along brook on west slope of Cabin Mountain and elsewhere.

LINARIA VULGARIS L. Common along Glade Run near Bill Burley's Camp.

MELAMPYRUM LINEARE Desr. var. LATIFOLIUM Barr. Near the foot of a peak on Canaan Mountain in Weimer Hollow.

MIMULUS RINGENS L. In cold bogs on Glade Run; frequent.

M. MOSCHATUS Dougl. In cold spring-fed bog near burning gob pile near coal mine entrance west of Davis, also near Thomas; very showy in its yellow flowers; rare. Collected under the senior author's field numbers 11598 and 11633.

SCROPHULARIA LANCEOLATA Pursh. On old cinder lumber railroad bed near Burley's Camp on Glade Run; infrequent.

VERONICA AMERICANA (Raf.) Schwein. In moist open situations at the beaver dam in Big Cove and elsewhere.

V. ANAGALLIS-AQUATICA L. f. ANAGALLIFORMIS (Boreau) G. Beck. In bogs along Glade Run and elsewhere.

V. OFFICINALIS L. In pastures along west slope of Cabin Mountain.

VERONICASTRUM VIRGINICUM (L.) Farw. Roadside near Thomas.

PLANTAGINACEAE

PLANTAGO MAJOR L. In waste ground around Burley's Camp; around Davis, and elsewhere. Appears to be the only common species in this area.

RUBIACEAE

HOUSTONIA SERPYLLIFOLIA Michx. On banks along Blackwater River in Big Cove.

MITCHELLA REPENS L. Abundant in deciduous woods on slopes of Brown Mountain near Big Cove.

CAPRIFOLIACEAE

DIERVILLA LONICERA Mill. On barren, rocky crests of Cabin Mountain where abundant.

VIBURNUM ALNIFOLIUM Marsh. Along the west slope of Cabin Mountain; very beautiful with its masses of coral-red fruit.

V. CASSINOIDES L. Along the Blackwater River near Davis.

V. DENTATUM L. On the old lumber railroad bed along Glade Run.

V. NUDUM L. On slopes of Canaan Mountain; very common.

SAMBUCUS PUBENS Michx. (*S. racemosa* L. of Gray's Manual and Britton & Brown's Flora). Abundant along the slopes of Cabin Mountain; very showy with its masses of red fruit.

DIPSACACEAE

DIPSACUS SYLVESTRIS Huds. In pasture on west slope of Cabin Mountain. Very abundant around the ruins of the paper pulp mills at Davis. A most interesting plant. The dense heads begin flowering in the middle, and the newer flowers move outward toward the base and apex, finally leaving the middle zone naked where the matured flowers have fallen.

CAMPANULACEAE

CAMPANULA APARINOIDES Pursh. Along the Blackwater River east of Davis.

LOBELIACEAE

LOBELIA INFLATA L. In open pastures on the west slope of Cabin Mountain and elsewhere.

COMPOSITAE

ANAPHALIS MARGARITACEA (L.) C. B. Clarke. Extremely abundant and showy when in flower, and covering all the pastures on the slopes of Cabin Mountain with great patches.

ANTENNARIA NEODIOICA Greene. Abundant on dry knolls east of Glade Run.

A. PARLINII Fern. On old lumber railroad bed along west slope of Cabin Mountain.

ASTER ACUMINATUS Michx. In open ground on crest of Snow Mountain near 4,000 ft.

A. MACROPHYLLUS L. Along old lumber railroad bed on west slope of Cabin Mountain and elsewhere.

A. NOVI-BELGII L. var. FLODES (T. & G.) Gray. In swamps along Glade Run and other streams; frequent. New to West Virginia.

A. PRENANTHOIDES Muhl. In deep, wooded swamp along the Little Blackwater River; infrequent.

A. PUNICEUS L. In wet soil in Big Cove.

A. PUNICEUS L. var. FIRMUS (Nees) T. & B. forma.[1] An abundant aster in low ground along Glade Run and similar situations elsewhere.

A. UMBELLATUS Mill. In upland situations on the pasture slopes; frequent.

BIDENS CERNUA L. In wet soil along Glade Run and elsewhere; frequent.

B. FRONDOSA L. In dry situations along old lumber railroad beds.

CACALIA ATRIPLICIFOLIA L. In old field at Harper Church near Elkton.

C. SUAVEOLENS L. A single colony in bog along Glade Run near Burley's Camp.

CIRSIUM ARVENSE (L.) Scop. On high knob of Cabin Mountain, and along old lumber railroad grade on west slope; also around old paper pulp mills at Davis.

C. MUTICUM Michx. In thicket on knoll in Big Cove.

C. PUMILUM (Nutt.) Spreng. Extremely abundant in all the low pastures in the area. It is a very handsome thistle here. The pure white *C. pumilum* forma *candidum* Fern., occurs occasionally with the species.

C. VULGARE (Savi) Tenore (*C. lanceolatum* of Scop and most authors, not Hill.) Around Burley's Camp, where it is common.

---

[1]Aster lucidulus Wiegand in West Virginia. H. A. Allard. Castanea 6: 145. 1941.

CHRYSANTHEMUM LEUCANTHEMUM L. var. PINNATIFIDUM Lecoq & Lamotte. The most common plant here, everywhere whitening the pastures and flats when in flower.

CREPIS CAPILLARIS (L.) Wallr. In pasture on Rich Mountain near Dry Fork.

ERIGERON ANNUUS (L.) Pers. At Burley's Camp; frequent.

EUPATORIUM PURPUREUM L.[10] Abundant in low meadows and thickets everywhere.

E. RUGOSUM Houtt. On old lumber railroad bed on west slope of Cabin Mountain and elsewhere.

E. PILOSUM Walt. Abundant on low flat lands throughout the area.

GNAPHALIUM MACOUNII Greene. Along lumber railroad beds near Glade Run and elsewhere. The glutinous stem and leaves catch numerous small insects, like the tobacco plant and others with glutinous secretions.

G. OBTUSIFOLIUM L. West of Burley's Camp in meadows here; frequent.

G. ULIGINOSUM L. In damp habitat north of Burley's Camp on west slope of Cabin Mountain; infrequent.

HELENIUM AUTUMNALE L. In open places in Big Cove near the beaver dams.

HELIANTHUS DECAPETALUS L. Along woodroad on Backbone Mountain at 3710 feet, and in the Blackwater Canyon near Manway Trail #3 below Douglas; very showy.

HELIOPSIS HELIANTHOIDES (L.) Sweet. A single plant on rocky outcrop of Canaan Mountain. Occurs in great abundance in the valleys below the Alleghany Front.

HIERACUM AURANTIACUM L. Frequent in the pastures and meadows of the area; very showy.

H. PANICULATUM L. In thickets on the mountain slopes throughout the area.

H. PRATENSE Tausch. Abundant in open, grassy situations and pastures.

H. SCABRUM Michx. Frequent in thickets near the beaver dam in Big Cove and elsewhere.

[10]The **purpureum** assemblage has been revised by Wiegand, "Eupatorium and its allies", Rhodora 22: 57-70, 1920; see also Wiegand and Weatherby, "The nomenclature of the Verticillate Eupatoria", Rhodora 39: 297-306, 1937. If their classification is followed, the taxons **"Eupatorium fistulosum** Barratt and **E. maculatum** L. are widespread in the region.

LACTUCA CANADENSIS L. VAR. LATIFOLIA O. Kuntze. In waste ground and thickets on slopes of Cabin Mountain and elsewhere.

L. FLORIDANA (L.) Gaertn. In thickets in Big Cove and elsewhere; frequent.

L. BIENNIS (Moench) Fern. In thickets in Big Cove and elsewhere; frequent.

RUDBECKIA LACINIATA L. Abundant in all damp situations on the highest knobs and in the swamps in Canaan Valley.

SOLIDAGO GIGANTEA Ait. Along Blackwater below Davis.

S. GRAMINIFOLIA (L.) Salisb. In open thickets in Big Cove and elsewhere; frequent.

S. ULIGINOSA Nutt. The most abundant goldenrod in the area covering the open ground of mountain tops, slopes and the flats along the streams in the Canaan Valley. Sheets of yellow flare over the meadows during the blooming season.

S. RUGOSA Ait. In thickets in Big Cove and elsewhere.

SONCHUS ARVENSIS L. VAR GLABRESCENS Guenth. Grab & Wimm. Along Blackwater opposite Davis.

TARAXACUM OFFICINALE Weber. In pastures and along some of the lumber railroad beds near Burley's Camp.

TRAGOPOGON MAJOR Jacq. On shaly cliffs, east slope of Canaan Mountain.

VERNONIA NOVEBORACENSIS (L.) Michx. One plant seen in pasture high up west slope of Cabin Mountain; infrequent in the area, but common at lower altitudes.

ARLINGTON, VA.
and
U. S. NATIONAL MUSEUM
WASHINGTON, D. C.

NOTES and NEWS

THE ALBINO MERTENSIA. Mr. Allard's note on this taxon in Castanea for September, 1951, brought to mind my experience with it. Ordinarily when one sees an interesting plant at some spot, and then goes back later, it proves to have been destroyed by one of the methods of civilized man—agriculture, burning, damming, draining, grazing, vandalism, weed-introduction, (not quite from a to z but near enough). In April, 1904, the writer joined a field trip conducted by the Academy of Natural Science of Philadelphia to the Valley of Red Clay Creek near Mt. Cuba, Delaware. Here he made his first acquaintance with the lavender-blue *Mertensia virginica*, and noted a solitary clump of the albino. Forty four years later he made a return visit; not only were the normal hued plants still abundant, but the albino clump was there too! By now, however, Japanese Honeysuckle had taken possession, so unless some parasite of this appears on the scene, the colony is doomed. It should be added that the albino was once occasional on the Chain Bridge Flats near Washington, D.C., and on a recent trip along the Shenandoah river for several miles above Harpers Ferry clumps of it were seen there.—EDGAR T. WHERRY, PHILADELPHIA, PA.

There is a nice clump of pure white bluebells 1¼ mi. west of Alderson, W.Va., but in Summers Co., about 250 yards below the mouth of Griffeths Creek, on the right side of the highway.—REV. FRED W. GRAY, RIVERDALE, MD.

We found one or more white bluebells several years ago on the island above Caldwell bridge between White Sulphur Springs and Lewisburg, Greenbrier County, W. Va. The island is a mass of bluebells each spring.—GLADYS TUKE, WHITE SULPHUR SPRINGS, W.VA.

THE STATEMENT OF SOUTHEASTERN PLANT-RANGES.—In Dr. Camp's excellent discussion of the proposed southeastern check-list in Castanea 16: No. 3, there appears on page 115 the suggestion that distributions should be included, with the from-to sequence standardized. Since

in the course of the preparation of his Manual (published 1933) the late Dr. John K. Small invited my collaboration in this field, some remarks upon it are here offered.

The plans of stating ranges used in the literature prepared in New England, where the significance of such data was first appreciated, naturally began with familiar areas and continued southward and westward. Entering the realm of plant-geography with a background of experience as a geologist, it seemed to me that this plan gave a misleading impression. During the Wisconsin Glacial stage the ranges of most of our present-day southeastern species must have been centered further down than at present. Then when some 12,000 years ago the climate ameliorated and the ice melted away, there was a wave of plant migration northward (also westward, the Mississippi valley having been very cold at ice maxima). With Small's approval, I arranged the statements of range for his Manual so as to correspond to this situation. In general the known or inferred ranges were outlined in the sequence: southeastern, southwestern, northwestern and northeastern limits.

It was interesting to find that the late Professor M. L. Fernald in stating the ranges in the 8th edition of Gray's Manual adopted this plan of range-statement (p. viii) for "primarily southern" plants, but retained the northeast to southwest plan for presumably northern ones. The difficulty of deciding the relationship of individual taxa was, however, considerable, and the choices there were not always in accord with the interpretation by others. While present day Canadian-New England plants may have been growing close to the ice margin in Pennsylvania, many of them may just as well have found refuge in the southern Appalachians, and have reoccupied the ice-devegetated territory from there. In preparing range-statements for the proposed check list, which can now be done more accurately than was practicable 20 years ago, during the compilation of Small's Manual, a uniform south-north plan seems likely to cause a minimum of confusion in the plant-geography field.—Edgar T. Wherry, Philadelphia, Pa.

I am afraid a check-list for the whole southeastern area would be too big a project for any one person, unless they simply took the names just as Small had them. And a mere list with no information about the various species would not be worth much. Very likely, though, it would be possible to put after each species its range and that would be better than nothing. Camp says Miss Arnold thinks the

names might be changed to conform with those of "Gray" (meaning Fernald). But by what criterion does she (and most northern botanists) decide that Fernald's work is "gospel" and Small's "apocrypha"? Small was older than Fernald, and had just as good opportunities to inform himself, and a much larger collection of southern plants to guide him. I don't think much of the idea of publishing such a check-list in Castanea, even in small installments. However, I have a suggestion. Publish check-lists for one state at a time, as you have recently done for West Virginia. Some of the states have persons competent to do that right now, and for others an intelligent person could compile the list from a manual without making too many mistakes.—R. M. Harper, University, Ala.

The Botanical Society of Westmoreland County, Pa.—One of the most active and enthusiastic groups of botanists in the Appalachian region is the healthy young Botanical Society of Westmoreland County, Pa., now over two years old. It was organized at Greensburg by Dr. Charles W. Demoise, a dentist of that city, on April 6, 1949, and officially incorporated on December 29, 1949. Monthly meetings have been held throughout much of the time since, with lectures, demonstrations and field trips. Now the Society has begun the publication of an interesting journal, the first issue of which (volume I) appeared under date of June, 1951. This publication, in offset form, consisted of 63 pages, with illustrations and maps, and has been named *Pyrularia*, in allusion to the fact that members of the Society, in a foray, established the northernmost known limit of the range of that genus in Westmoreland County. The editor is Charles W. Kalbfus, 542 Vine St., Greensburg, Pa., and the subscription price is $1.25 a year. Apparently one issue a year is contemplated.

Plants of Pittsburgh and Vicinity.—It might be asumed that plant life would be a negligible factor in the vicinity of Pittsburgh, better known as the steel manufacturing center of the world, but the recent publication of a "Checklist of the Flowering Plants and Ferns of Allegheny County, Pennsylvania", by L. K. Henry and W. E. Buker, both of Carnegie Museum, reminds that there is not only a flora but a distinct interest in the flora. The publication, extracted from *Trillia*, No. 11, 1951, consists of 123 pages, in offset form, with about 12 to 15 species listed on each page, indicating that approximately 1500 species are included. Species considered common in

the county are given without comment while if the plant is rare collection data are given. Allegheny County has an area of 725 sq. mi., and a population, according to the 1950 census, of 1,508,255.

EDIBLE WILD PLANTS OF WEST VIRGINIA.—Phi Epsilon Phi, national honorary botanical fraternity, has just issued a mimeographed publication of 62 pages, on the "Edible Wild Plants of West Virginia" (December, 1951), written by William Gillespie, forestry student at West Virginia University. This includes accounts of over 200 species of food value, with notes on methods of preparation for eating, all of which were personally tried by the author. The book can be purchased from the Herbarium, West Virginia University, Morgantown, for 25 cents.

ON THE ORIGIN OF THE NAME "PIPESTEM".—In Summers Co., W. Va., there is a creek, district, and post office called Pipestem, and since these are obviously named for some plant, I undertook an investigation to determine the species. In Webster's International Dictionary (2nd ed.) one of the definitions of pipestem is "Any of several slender-stemmed plants as the fetterbush (*Neopieris nitida*) of the southern United States".

Visiting the section, I interviewed two elderly gentlemen who had lived all their lives in the Pipestem community. One, the postmaster at Pipestem, Mr. James Lewis Ellison, 69 yrs. old, said that the creek which meanders across the boggy mountain top was first called Pipestem Creek and that the settlement took its name from the creek. Both Mr. Ellison and his wife were agreed that there had been a settlement at that place for well over 100 years and they were agreed that there had been a postoffice for well over 70 years. They very kindly pointed out the shrub from which the creek took its name. This shrub grows profusely less than 200 feet from the postoffice alongside the state highway (Route 20). They said the shrub was used extensively for stems for the clay pipes that were used almost exclusively at that early date. They said the canes were also used for stems for corncob pipes. They remarked that the clay pipes were not always available to many people who were rather poor and that some little social distinction was made between those

who had clay pipes fitted with the local stems and those who must depend on corncobs fitted with the same kind of canes.

Before leaving the community I was fortunate to speak to a very old man who came along the highway and watched me as I gathered some of the "pipestem" shrubs, which proved to be *Spiraea alba*. He was much interested and told me that his name was Everett Cooke and that he had lived in the community since his birth in 1874. He had a story or incident to relate that seemed to be a reasonable explanation of how the comunity came by its name. He said that before his birth or not long thereafter—he was not sure—some people came from Indiana for a visit with relatives who had remained in the community while they had migrated to the "West". While the visitors were in the community engineers were surveying the area as a part of the process of separating it from Mercer County to form Summers County*. These visitors from the West had gathered a large supply of the shrub to take back West with them to be used by themselves and neighbors as pipestems. They were in the process of gathering the canes when they came on the surveyors. They suggested that they label their map, so far as that community was concerned, as Pipestem District of Summers County, and the creek which traversed a part of it as Pipestem Creek.

Many of the people in the Pipestem community speak of the community of Pipestem as "Pipestems". This was probably due to the fact that the people used the canes so generally that they thought of the name in the plural rather than the singular.—Fred David Rogers, Athens, W. Va.

*Summers County was formed in 1871.

Charles F. Jenkins (obituary).—Mr. Charles Francis Jenkins, Philadelphia publisher and a member of the Southern Appalachian Botanical Club, died on July 2, 1951. He was born at Norristown, Pa., December 17, 1865 and was educated in the public schools of Pennsylvania. He received honorary LL.D degrees, from Swarthmore College in 1926, and from the University of Pennsylvania in 1944. He had been a publisher and author since 1883, as well as being associated with various commercial concerns and educational institutions. He was chairman of Farm Journal, Inc., a director of the Provident Trust Co., chairman of the board of Buck Hill Falls Co., vice president of the Deemer Steel Casting Co., a member of the

board of managers of Swarthmore College, president of the board of Ellis College, a member of the advisory committee of Pennsylvania Hospital, and president of the Fuel Savings Society.

He is known principally to botanists as the founder and director of the Hemlock Arboretum, at "Far Country", Kitchen's Lane, Germantown (Philadelphia). This arboretum, founded in 1931, has an area of 7½ acres and is devoted to the collection and dissemination of knowledge concerning the genus *Tsuga*. In 1947 there were 9 species and 40 varieties being grown on the grounds, which were free and open to the public at all times. A publication, "The Hemlock Bulletin" is issued quarterly. (See Mr. Jenkins' articles, "The Hemlock Arboretum at 'Far Country' ", in Parks and Recreation, 25 (3): 110-116. 1941; and "Hemlock—The Queen of Conifers", in Arnoldia 6 (11-12): 49-60. 1946.)

F. W. Pennell.—Francis Whittier Pennell was born August 4, 1886 on a farm near Wawa, Delaware County, Pennsylvania, and died of a heart attack while attending Meeting at Media, on Sunday, February 3, 1952. He is survived by his wife, Anne, by a son, and by several brothers and sisters. He was educated at Westtown School and the University of Pennsylvania, receiving here the degrees of B. S. in 1911 and Ph. D. in 1913. From 1914 to 1921 he was on the staff of the New York Botanical Garden, and then became Curator of Plants at the Academy of Natural Sciences of Philadelphia.

Early showing an interest in Nature, he was encouraged by local amateur botanists, among whom he noted Dr. William Trimble as having been especially helpful. It was the head of the Botany Department of the University of Pennsylvania, the late Dr. John M. Macfarlane, who stimulated him to take up Botany as his life work. Enthusiastic over Darwin's views as to the evolution of floral and other features through natural selection, Macfarlane was especially interested in the bearing of the Scrophulariaceae on that field, and suggested the study of members of this family as a topic for a doctoral thesis. The outcome is known to every taxonomist: Francis W. Pennell became a world authority on this complex plant family.

He was a prolific writer, not only on this group, but on various other plants, on taxonomic problems in general, and on botanical history. Complete lists of his writings will be duly published elsewhere; here may be mentioned the major work to which every student

of the flora of the southern Appalachians turns for useful keys to and copious information upon the "scrophs," "The Scrophulariaceae of Eastern Temperate North America: Monograph 1, Academy of Natural Sciences of Philadelphia, 650 pages, 1935.

In 1927 I had the privilege of driving him on a month-long auto trip to study the genus *Chelone* in the Appalachians and Interior Plateau country; and in 1931, on a longer one to study the members of the family in the western states, under a grant from the National Research Council. I was impressed, first, by his active mind: he was ever observing phenomena and relationships among the plants we encountered—and not by any means only those of his chosen family—and discussing them in an interesting way, indeed continuing even when circumstances diverted my attention elsewhere. I was further impressed by the extent to which an interest in science could overcome handicaps. As a youth, Francis told me that he was delicate, and had been excused from active farm duties. He had thereby attained a sort of inferiority complex concerning mechanical devices, and was unable to master even such an operation as applying an air hose to a valve to fill a sagging tire. He had early been admonished that getting ones' feet wet would lead to illness, and had gained an extreme aversion to water (I did all the collecting of aquatic scrophs). And he would shrink in fear at the approaching of a barking dog or even a curious cow. Correspondingly, he was proud of his control over non-mechanical things: thus, when we crossed a standard-time boundary line, he promptly changed his watch accordingly. However, his intellectual curiosity was so powerful that he was able to surmount these and other difficulties, and do a vast amount of productive field work, even in the wilds of South America. His loss is keenly felt by the professional and amateur botanists of the Philadelphia Botanical Club, of which he was for some years President, as well as by taxonomists throughout the world.—Edgar T. Wherry, University of Pennsylvania.

Ivan D. Shunk.—Dr. Ivan D. Shunk, Professor of Botany and Bacteriology at North Carolina State College, died suddenly of a heart attack on July 11, 1951, at the age of 60. He was born in Ohio and reared for a period of his boyhood in Canada. He attended West Virginia University (1909-1913) where in his year of graduation he was elected to Phi Beta Kappa. Here he began his teaching career

as Instructor in Botany (1916-1917) under Dr. J. L. Sheldon. After an interim of graduate study at the University of Chicago, he came to North Carolina State College in the fall of 1919 where he made an enviable record as a teacher in a wide range of courses. He was awarded the Ph.D. degree in Microbiology at Rutgers University in 1928.

Dr. Shunk will be remembered by his associates for his loyalty and willingness to cooperate in all department activities. His efficiency was much enhanced by his possession of a remarkable memory. His range of knowledge was phenomenal. In addition to his studies in his special field of bacteriology, he assisted the writer in summer work on the plant communities of the coastal plain. This contribution was invaluable. The plant science group at North Carolina State has lost one of its most capable and revered members.—B. W. Wells, North Carolina State College.

Spring Meeting of the Club.—As has been customary for the past few years, the Southern Appalachian Botanical Club will hold its spring meeting jointly with the Association of Southeastern Biologists and the Southeastern Section of the Botanical Society of America. This year's meeting will be held April 18 and 19 at Agnes Scott College, Decatur, Georgia. Reservations may be made at the Hotel Candler, Ponce de Leon and Church Street, Decatur, Georgia, where single rooms with bath are available at $3.00 up and doubles at $4.50 up. Hotels available in nearby Atlanta include the Briarcliff, Clermont, Southland, Atlanta Biltmore, Georgian Terrace, Cox-Carleton, Henry Grady, and Aisley, all within 6 miles of Agnes Scott College.

BOOK REVIEWS

FLOWERING TREES OF THE CARIBBEAN.*—One of the most beautiful books on American botany to appear in recent years has just been produced by Bernard and Harriet Pertchik and published on December 15, 1951, by Rinehart & Company. The book, of folio size, consists of an introduction by William C. White, a bibliography and a glossary, while the main body of the work includes descriptions of twenty-nine species of flowering trees, each accompanied by a full-page, six-color painting of the species. The Pertchiks are a young couple in the field of commercial art, but the botanical descriptions were prepared with the assistance of botanists of the United States and the Caribbean countries. From two to four pages of descriptive material are given for each species, giving, in addition to botanical characteristics, information concerning the economic importance, the history, literature, folklore and legends associated with each. An interesting feature is the presentation of the various common names used in the different countries.

Among the species included are frangipani, rose of Venezuela, potato tree, Napoleon's button, cannonball tree, queen of flowers, African tulip tree, flamboyant, saman tree, long John, pride of Burma, shower of gold, madre de cacao, poui, orchid tree, chinaberry, geiger tree, lignum vitae, jacaranda, and apple blossom cassia. On the frontispiece is represented *Ochna mossambicensis*, with its flowers resembling "wry, sly, quizzical faces".

Several hundred common names, from various languages, appear on the 117 pages of the main body of the work and an index to these would have been most useful.

The book should be of value as a source of information to botanists and of especial interest to American tourists spending their vacation in the tropical lands of the Caribbean.—EARL L. CORE, WEST VIRGINIA UNIVERSITY.

*Flowering Trees of the Caribbean. Bernard and Harlett Pertchik. 12 + 125 p. $10. Rinehart & Company, Inc., New York and Toronto. 1951.

A Superior Fern Book.*—The long awaited volume on the ferns of Georgia has now been published, under the sponsorship of the Garden Club of Georgia, with the financial aid from over 200 member clubs, 6 Atlanta business concerns, and some interested Individuals. It is a regrettable commentary on present-day economics that in spite of these combined contributions, it has been found necessary to charge for a book of only about 200 pages, the exorbitant price of $5.00.

However, for those who can afford it, the book is worth this, having meritorious features which could well be adopted by publishers of floras of other regions. First, the frontispiece shows the state, its counties, and its principal physiographic divisions, with which the maps of individual species-ranges can readily be compared, and an idea of the significance of their geography be obtained. Had the areas of limestone outcrop in the western Coastal Plain been added, the story would have been complete. Then some 30 pages are devoted to informative discussions of historical, taxonomic and nomenclatorial matters, with well-arranged keys and directions for using them.

For each species a left-hand page carries paragraphs on Name, Description, Habitat, Range, and Remarks. Then the facing page has drawings about half natural size (or if otherwise, with the degree of enlargement indicated) and with individually enlarged insets of technical parts; and tucked away in one corner is a map of the state showing by black disks exactly where each species is known to grow.

Reflecting the fact that the manuscript of the work was completed a good many years ago, the sequence of taxa and their classification are somewhat out of date. In particular it seems regrettable that the members of the Marsh Fern group are lumped with *Dryopteris*, to which Christensen and others have more recently shown that they are but remotely related. Fortunately, on the other hand, the absurd confusion introduced into the nomenclature of the Lipferns in the current Gray's Manual was avoided.

On the whole the drawings, chiefly by the junior author, are superlatively fine. The poorest is *Lycopodium alopecuroides*, which appears to have been made from an immature or anomalous specimen. The veining of *Ophioglossum engelmanni*, though correctly described in the text, is not accurately drawn. In most cases, however, the illustrations are among the best ever published for the ferns represented. —Edgar T. Wherry, University of Pennsylvania.

*Ferns of Georgia. Rogers McVaugh and Joseph H. Pyron. University of Georgia Press, Athens. Dec. 7, 1951. 195 plus xvii pages, $5.00.

Reprints should be ordered when galley proof is returned to the editor. Morgantown Printing & Binding Co., Morgantown, W. Va., have furnished the following rates:

Copies	2pp.	4pp.	8pp.	12pp.	16pp.
25 Copies	3.65	4.25	$ 530	$ 7.95	$10.60
50 "	3.80	4.50	5.80	8.70	11.60
75 "	3.95	4.75	6.30	9.45	12.60
100 "	4.10	5.00	6.80	10.20	13.60
150 "	4.40	5.50	7.80	11.70	15.60
200 "	4.70	6.00	8.80	13.20	17.60
300 "	5.30	7.00	10.40	15.60	20.80

Reprints will be folded and if more than four pages, saddle stitched. Covers similar to that of **Castanea**: First 50 copies, $2.00; Additional covers, 1½ cents each.

Common Seed Plants

OF THE

Mid-Appalachian Region

P. D. Strausbaugh, Earl L. Core, Nelle Ammons

Includes simple and clear-cut keys to families, genera, and species common throughout the entire region of the middle Appalachian Mountains. The book will meet the needs of the flower lover, the general botanist, the forester, and the ecologist, and is especially designed for use in college botany classes. The book contains a glossary and an index, also nine full-page plates illustrating leaf forms, lobing, margins, tips and bases, stamens, carpels and pistils, corolla and flower types, inflorescences and fruits.

xxiv plus 305 pages — $2.75 per copy

THE BOOK EXCHANGE

262 Willey Street Morgantown, W. Va.

WILD FLOWER

The only publication devoted exclusively to the Conservation of Wild Flowers through their study, cultivation and preservation in Sanctuaries.

FINE ILLUSTRATIONS

Invaluable to teachers, garden clubs and conservationists.

MEMBERSHIP and MAGAZINE
$2.00 PER YEAR

Sample for a stamp. Ask for club rate with your favorite magazines.

OFFICIAL ORGAN
OF THE

Wild Flower Preservation Society

3740 Oliver Street, N. W.
WASHINGTON, D. C.

AMERICAN FERN JOURNAL

A Quarterly Devoted to Ferns and Fern Allies, published by

The American Fern Society

Subscriptions $2.35 a Year

(Foreign $2.45)

Sent free to all members of The American Fern Society. Annual dues, $2.00 Life membership, $35.00

Send for Free Sample Copy

C. V. Morton

Smithsonian Institution
Washington 25, D. C.